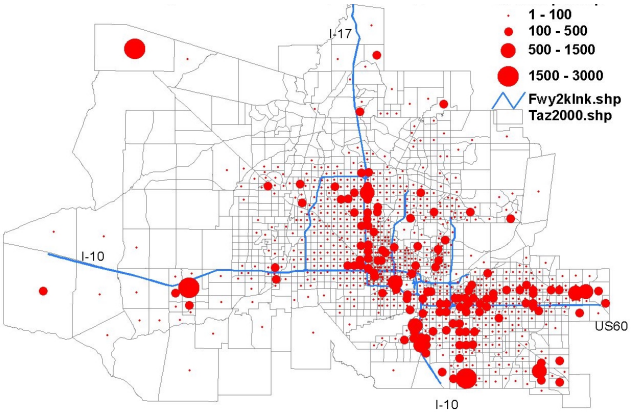
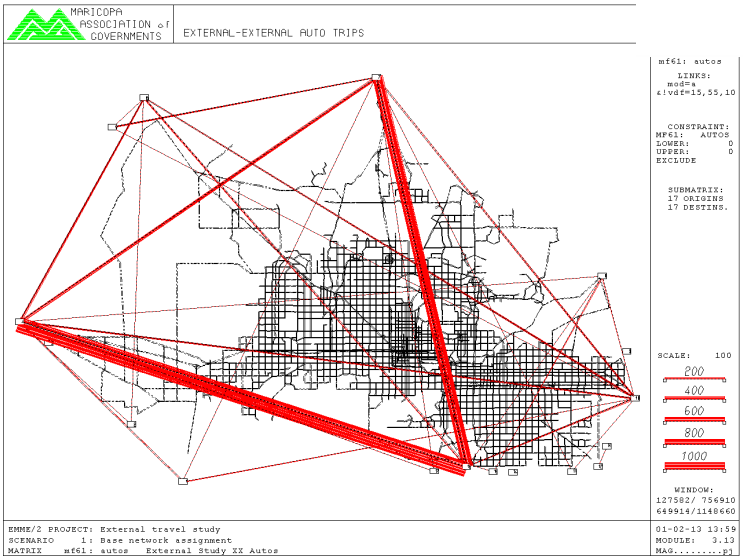
# PHOENIX EXTERNAL TRAVEL SURVEY

## FINAL REPORT




Prepared for

Maricopa Association of Governments
302 North 1st Avenue, Suite 300
Phoenix, Arizona 85003

Prepared by

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February 21, 2001

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## Introduction

The Maricopa Association of Governments (MAG) has performed the 1999 External Travel Survey as part of its responsibility for maintaining the regional travel demand forecasting model for the Phoenix metropolitan area. This vital tool is used for regional transportation planning and for supplying design volume forecasts for most major transportation projects undertaken by the Arizona Department of Transportation (ADOT), Maricopa County, and municipalities within the region.

MAG is continuously involved in efforts to update the regional travel model. The external travel model component of the model estimates travel through the region (external-external, or through, travel) and travel into and out-of the region (internal-external and external-internal travel). The regional travel modeling area has increased significantly since the last update to the external travel model components in 1986. Thus, in addition to changes in external travel that may have occurred over time, there are changes in external travel due to the changing modeling area that must be properly reflected in the regional travel model. The results of the 1999 External Travel Survey are necessary to the continued production of high quality travel forecasts for the region.

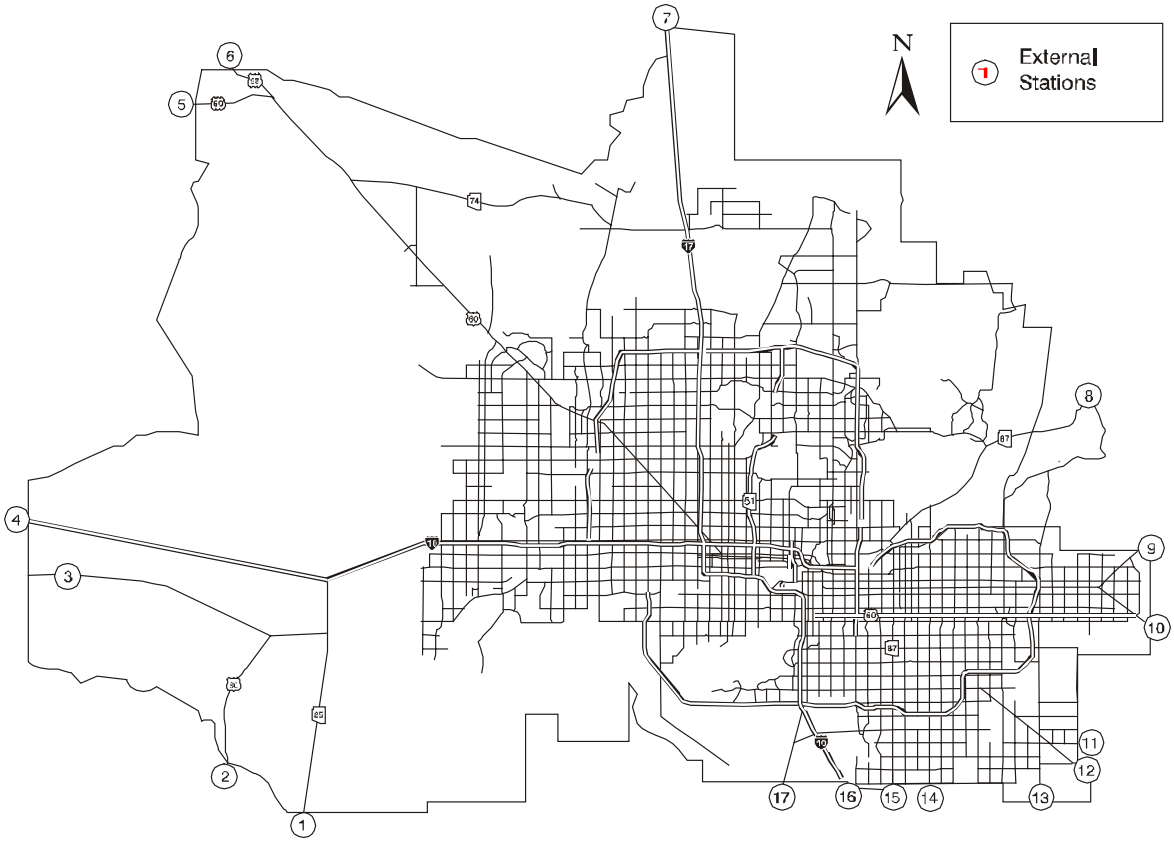
The external survey was a traditional intercept survey where information on the current trip being made was collected. A sample of vehicles leaving the region was surveyed at the external survey sites. A total of fifteen sites were surveyed. These included each of the major highways that leave the region. Traffic counts were collected at these fifteen sites, plus two additional low-volume sites. A map showing the study area and survey locations is contained in Figure 1.

This Final Report documents the Phoenix External Travel Survey that was conducted for the Maricopa Association of Governments in late summer, 1999. A summary is provided of each of the major study tasks including:

- sample selection (memo attached as Appendix A),
- survey station layouts (memo attached as Appendix B),
- permits and insurance,
- traffic count and classification data (data attached as Appendix C),
- survey preparation (training manual attached as Appendix D),
- survey conduct and lessons learned,
- data coding,
- trip factoring, and
- summaries of expanded survey data

Individual technical memoranda that were prepared as part of the study are contained in the Appendices.

## Figure 1
## MAG External Station Sites



## Sample Selection

Roadside interviews were conducted at 15 external stations along the perimeter of the MAG study area (see Figure 1 and Table 1). These locations included three interstate highways, three US highways, four state highways, and five county roads. Two-day (48 hour) traffic counts were collected at each of the 15 external stations and two additional sites. The surveys were conducted between sunrise and sunset on Tuesdays, Wednesdays, and Thursdays over the five-week period starting September 14, 1999 and ending October 13, 1999. Surveys were conducted on these middle weekdays to avoid surveying weekend travelers and to avoid the typical changes in volumes on Mondays and Fridays. The thirteen survey days required almost five weeks of field effort. The survey schedule is shown in Table 1.

A simple procedure was used for selecting the sample for the roadside survey. First, the number of required surveys was estimated using sample statistics. The statistics took into consideration traffic volume at the external station (based on estimates or on the most recent counts prior to the survey as shown in Table 1) and the desired confidence level (95%). An "over-sample factor" of 15 percent was also included to account for loss of surveys due to data errors. On Interstate freeways, sample sizes were doubled.
Based upon the results of the sample statistics, the "targeted" number of surveys was identified. For the Phoenix External Travel Survey, this target ranged from 330 to 910 surveys (Table 1). The low end of the range applied to low-volume county road stations while the upper end of the range applied to high-volume interstate stations. Values between these two extremes applied to moderate-volume locations. Interim, hourly targets (number of completed surveys in one hour) were also established for each site to enable progress to be monitored on an on-going basis.

Site-specific staffing requirements were determined based upon the number of surveys desired and the rate at which individual surveys could be processed. Generally, the number of interviewers ranged from 2 to 7, depending on the site. This number included all necessary relief personnel. Additionally, a site supervisor and one or two flaggers/traffic control supervisors were required at each site.

Vehicles to be surveyed were pulled in "platoons", or groups, equal to the number of interviewers present at the site. The intention of the vehicle selection process was to pull vehicles randomly. However, safety procedures dictated that certain vehicles be allowed to pass without any attempt to stop them for a survey. These vehicles were generally observed to be traveling at a high rate of speed or in closely packed platoons.

Once the platoon arrived at the survey location, drivers from each vehicle were interviewed simultaneously by the assigned survey personnel. After the surveys were completed, the vehicles were released and the next platoon was pulled. This process continued throughout the survey period. The site supervisor monitored survey progress and instructed interviewers and flaggers to increase or decrease the turnover rate to achieve the desired number of surveys.

Appendix A contains the technical memorandum detailing the sample selection process.

**Table 1**
**Survey Schedule and Desired Sample Sizes**

| Site Number | Site Location | Date Surveyed | Estimated Average Daily Traffic (Two-way) | Desired Number of Surveys |
|---|---|---|---|---|
| 1 | SR-85 at Patterson Road | Thursday, September 30, 1999 | 9,000 | 440 |
| 2 | Old U.S. 80 at Gila River | Tuesday, September 14, 1999 | 1,000 | 330 |
| 3 | Salome Highway east of Courthouse Road | Wednesday, September 15, 1999 | 1,000 | 330 |
| 4 | I-10 at 477th Avenue | Tuesday, October 5, 1999 | 15,000 | 900 |
| 5 | U.S. 60 at 355th Avenue | Thursday, September 16, 1999 | 2,000 | 380 |
| 6 | U.S. 93 at Maricopa/Yavapai County Boundary | Wednesday, October 13, 1999 (rescheduled due to weather) | 6,000 | 430 |
| 7 | I-17 at Maricopa/Yavapai County Boundary | Thursday, October 7, 1999 | 30,000 | 910 |
| 8 | SR-87/Beeline Highway east of Bush Highway | Tuesday, September 28, 1999 | 7,000 | 430 |
| 9 | SR-88 south of First Water Road | Count Only Location | 5,000 | None |
| 10 | U.S. 60 about 3 miles southeast of Goldfield Road | Wednesday, October 6, 1999 | 16,000 | 900 |
| 11 | Ocotillo Road east of Meridian Road | Wednesday, September 22, 1999 | 2,000 | 380 |
| 12 | Rittenhouse Road at Combs Road | Tuesday, September 21, 1999 | 3,000 | 410 |
| 13 | Hunt Highway 1.7 miles east of Ellsworth Road | Tuesday, September 21, 1999 | 3,000 | 410 |
| 14 | Gilbert Road south of Hunt Highway | Count Only Location | 1,000 | None |
| 15 | SR-87 at SR-87/SR-587 Junction | Wednesday, September 22, 1999 | 8,000 | 440 |
| 16 | I-10 south of Hunt Highway | Tuesday, October 12, 1999 | 37,000 | 910 |
| 17 | SR-347/Maricopa Road south of Hunt Highway | Wednesday, September 29, 1999 | 9,000 | 440 |

## Survey Station Layouts

Before scheduling the proposed sites for survey, each of the sites was visited to review conditions in the field and finalize the site location and the traffic control requirements. Each of the proposed sites was visited before any surveys were scheduled to review conditions in the field and finalize the site location and the traffic control requirements. During the site visit, consideration was paid to ambient traffic conditions, apparent sight distances, prevailing speeds, presence/absence of shoulders, auxiliary lanes, and roadside development. Photographs and sketches were prepared of the proposed survey site.

In order to obtain approval on the necessary permits and provide the survey crew with a safe working environment, traffic control plans were prepared showing the devices needed to conduct the survey. These plans reflected the existing roadway geometry, signing, temporary traffic control devices such as signs and cones, and the interview refuge area. The traffic control plans were prepared in accordance with the Manual on Uniform Traffic Control Devices (MUTCD) and Arizona Department of Transportation (ADOT) guidelines. ADOT, Maricopa County, and other agencies were given the opportunity to extensively review these plans before their approval was granted to conduct the survey.

A master schedule was developed that indicated the date and times that each station was to be surveyed. Two make-up days were also scheduled in the event that weather conditions were to prevent the survey from occurring. A rain-out did occur at one site requiring one of the make-up days to be used. Generally, the sequence of surveys was from lower to higher volume sites.

Appendix B contains the technical memorandum detailing the overall survey schedule and the specifics of each survey site including pictures of each site and site traffic control plans.

## Permits and Insurance

Prior to conducting surveys within public rights-of-way, permits needed to be obtained. This process included meeting and coordinating with affected agencies such as Maricopa and Pinal Counties, local municipalities, and several districts of ADOT. Formal permit applications for each site were submitted to the agency having jurisdiction. These applications contained a statement of the work and precise location, the schedule and duration of the work, insurance certificates, and the initial traffic control plan.

After a period of review, comments on the permits were received. These comments were addressed to the satisfaction of the reviewing agency and in all cases permit approvals were granted. No survey activities occurred until final approval was obtained on the permits. Any deviation from the permitted activities, such as a change in schedule or location, required that the approving agency be contacted and made aware of the changes prior to the work.

The permit application process also required that Parsons and their sub-consultants demonstrate that the insurance requirements of Maricopa County and ADOT could be met. Certificates of insurance were provided describing the amount of coverage and indemnifying MAG, Maricopa County, & ADOT.

## Traffic and Classification Counts

Vehicle classification counts were collected simultaneously with the surveys. These counts were used along with the survey data in order to perform the expansion of the data to represent the full driving population at the survey site.

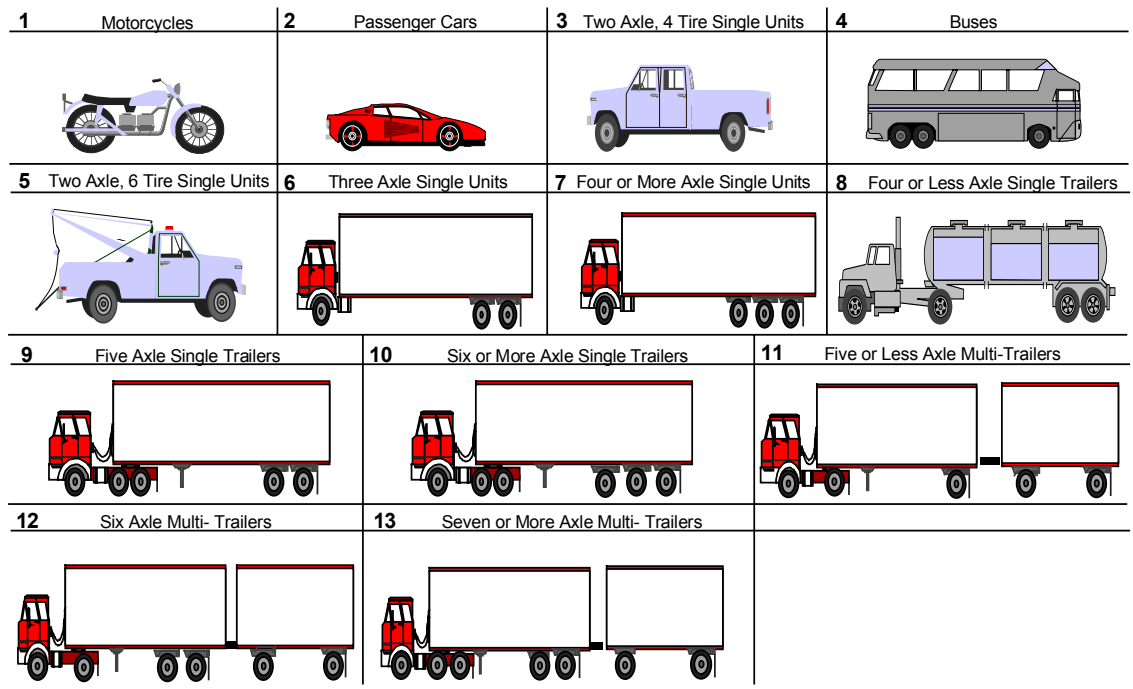
Mechanical classification counts were taken using a method by which each vehicle was counted as a specific type (passenger car, bus, 2-axle truck, multiple axle truck, etc.). Classification is important to the external survey since different survey data were collected for trucks and autos. The classifications performed for this survey used the normal FHWA vehicle classification scheme (see Figure 2). Machine classification counts were taken at all of the survey locations, including the two additional sites. Also, manual classification counts were collected to provide a check of the machine counts. The unadjusted counts are included in Appendix C.

For data expansion purposes, the classification data were aggregated into three groups to match the field data collection. FHWA classifications 1, 2, and 3 (motorcycles, autos, and two-axle, four-tire trucks) were grouped into the auto category. FHWA classifications 4, 5, 6, and 7 (buses, two-axle six-tire trucks, three-axle single-unit trucks, and four-axle single unit trucks) were grouped into the medium truck category. FHWA classifications 8 through 13 (all multiple unit trucks) were grouped into the heavy truck category.

## Survey Site Preparation

A competitive bid process was used in selecting subcontractors. A Request for Proposal (RFP) was prepared that identified staffing, traffic control, and flagging requirements as well as the overall project schedule. The RFP was issued to several firms and the lowest bidder capable of adequately providing all necessary services was selected. Several on-site services were required to ensure the safety and comfort of the survey crews, including:

**Figure 2**
**FHWA Vehicle Classifications**




- *Traffic Control* – A traffic control subcontractor provided the variable message signs, fixed signs, cones, and other appurtenances to define and protect the work zone. They also provided flaggers for each site.

- *Vehicle Classification Counts* – Classification counts were required at each location. A subcontractor placed machine counters at each site in advance of the survey period so that the counts could be collected simultaneously with the roadside surveys. At least 48 hours of classification counts were collected at each location.

Manual classification counts were collected at two locations to validate the automated classification counts.

- *Interviewers* – The subcontractor that collected the traffic counts was also responsible for providing all interview and relief staff needed to conduct the roadside surveys.

- *Portable Toilets* – Since the survey crews were working full days at remote locations, portable toilets were provided at each site. Deliveries were made the morning of the survey and pick-ups were made after the survey was completed.

In order to minimize safety and liability concerns all flaggers participating in the surveys were required to be certified by the Arizona Department of Transportation (ADOT). A mandatory training session was held for interview staff prior to the surveys. Topics that were covered in the session included individual roles and responsibilities, roadside safety, survey methods, traffic control, dealing with the public and press, and ensuring that quality data is collected. The training session also included a period of role playing which allowed interviewers to survey the instructor or each other to become familiar with the forms, methods, and some possible responses. A copy of the training manual is included in the Appendix D.

## Survey Conduct and Lessons Learned

The field surveys began after final approvals of the permit applications were obtained and the scheduling and coordination logistics were completed. The survey period ran from September 14, 1999 to October 13, 1999. The surveys were conducted in order of increasing traffic volume. This permitted a test of the many logistics prior to the high-volume survey sites. Refinements in survey procedures, placement of traffic control devices, and survey forms were possible using this approach. It also provided further training for survey staff in increasing the speed and accuracy of the data collection process.

The morning set-up and evening take-down required the coordination of the traffic control and the survey staff. Each morning the traffic control subcontractor set out the traffic control for the site. The traffic control set-up was generally completed right around sunrise, permitting a survey start of a half-hour after sunrise. The site supervisor drove completely through the survey area to review placement and legibility of traffic control devices. Any required changes were made to the traffic control before the surveys would begin. At a couple of locations, the rising or setting sun had the potential to create a blind spot for motorists approaching the survey crew. At those sites, the start was delayed slightly or the finish accelerated to avoid the problem.

The site supervisor also coordinated the surveyors during the traffic control set-up. This included distributing radios, hard hats and vests, survey forms, pamphlets, clipboards, and pencils. The staff would then take their positions and the survey would begin.

Once the survey staff was in position, the site supervisor radioed the flagger(s) to send the first platoon of vehicles. The flagger would then divert the specified number of vehicles (one for each surveyor) into the survey areas. The site supervisor directed each vehicle into a survey position. As each vehicle pulled up, the interviewer noted the time of the interview and the number of persons in the vehicle. The interviewer introduced the survey, distributed an informational brochure, and ascertained that the motorist was willing to participate. Persons that were not willing to participate were thanked for their time and allowed to leave once traffic was clear.

Because of the simplicity of the forms (see Figures 3 and 4), the surveys were completed very rapidly (one to two minutes per survey). Once the interviews in a platoon were complete and had cleared the survey area another platoon was brought into the survey area. The survey continued in this fashion throughout the day.

The two-way radios enabled the site supervisor to change the platoon size as required. This allowed for notifying the relief person to act as an extra surveyor if the sampling rate was too low, or it allowed for notifying the flaggers to select smaller platoons if a surveyor had to take a break and the relief person was not available.

Interview staff were periodically relieved during the course of the day. Although it was an informal process, all surveyors received at least a 15-minute break in the morning, a half-hour for lunch, and a 15-minute break in the afternoon. The staff conducting the interviews did not elect to split shifts. As a result, interview staff worked 12-hour days throughout the survey. The long days, combined with the heat, resulted in more frequent breaks for interviewers during the day.

Figure 3

Questionnaire Number: 1

# MARICOPA ASSOCIATION OF GOVERNMENTS
# EXTERNAL TRAVEL SURVEY — AUTOMOBILES

Station Location: US 93 at Maricopa/Yavapai County Boundary Station #: 6 Date: 10 /13 /1999

Interviewer: _____ Day of Week: Wed

| | | | Vehicle 1 | Vehicle 2 |
|---|---|---|---|---|
| Time: | | | ☐ 1 - a.m. ____:____ ☐ 2 - p.m. | ☐ 1 - a.m. ____:____ ☐ 2 - p.m. |
| Vehicle Type: | | | ☐ 1 - passenger car<br>☐ 2 - pickup / van / sport utility<br>☐ 3 - RV (self-contained)<br>☐ 4 - motorcycle | ☐ 1 - passenger car<br>☐ 2 - pickup / van / sport utility<br>☐ 3 - RV (self-contained)<br>☐ 4 - motorcycle |
| Number of people in vehicle: (include infants) | | | ☐ 1 ☐ 2 ☐ 3 ☐ 4<br>☐ more (write): _____ | ☐ 1 ☐ 2 ☐ 3 ☐ 4<br>☐ more (write): _____ |
| What State do you live in? | | | ☐ Arizona<br>☐ other (write) _____ | ☐ Arizona<br>☐ other (write) _____ |
| If Arizona, what county do you live in? | | | ☐ 1 - La Paz ☐ 2 - Maricopa<br>☐ 3 - Pinal ☐ 4 - Yavapai<br>☐ 5 - Yuma ☐ 6 - Gila<br>☐ 7 - Other (write) _____ | ☐ 1 - La Paz ☐ 2 - Maricopa<br>☐ 3 - Pinal ☐ 4 - Yavapai<br>☐ 5 - Yuma ☐ 6 - Gila<br>☐ 7 - Other (write) _____ |
| Was the last place you stopped in Maricopa County? (See Map)<br><br>(Be Specific and get some type information, McDonalds, Safeway, cross streets, etc.) | IF YES: | Place | | |
| | | Street Address | ____ ____ _____ ____<br>Number Dir Street Type | ____ ____ _____ ____<br>Number Dir Street Type |
| | | Intersecting Streets | ____ _____ ____<br>Dir Street Type<br>& ____ _____ ____<br>Dir Street Type | ____ _____ ____<br>Dir Street Type<br>& ____ _____<br>Dir Street Type |
| | | City & Zip | _____ _____<br>City Zip Code | _____ _____<br>City Zip Code |
| | | What was your main purpose for being there? | ☐ 1 - home ☐ 2 - work<br>☐ 3 - work-rel. ☐ 4 - delivery<br>☐ 5 - school ☐ 6 - recreation<br>☐ 7 - shop ☐ 8 - eat<br>☐ 9 - social ☐ 10-pick-up/drop<br>☐ 11-other off passenger<br>➥(write) _____ | ☐ 1 - home ☐ 2 - work<br>☐ 3 - work-rel. ☐ 4 - delivery<br>☐ 5 - school ☐ 6 - recreation<br>☐ 7 - shop ☐ 8 - eat<br>☐ 9 - social ☐ 10-pick-up/drop<br>☐ 11-other off passenger<br>➥(write) _____ |
| | IF NO: | How did you enter Maricopa County? (What Road or Station Number?) | Station Number _____<br>or<br>Road _____ | Station Number _____<br>or<br>Road _____ |
| What time did you leave from there? (or, What time did you enter Maricopa County?) | | | ☐ 1 - a.m. ____:____ ☐ 2 - p.m. | ☐ 1 - a.m. ____:____ ☐ 2 - p.m. |
| To what city or area are you going next? | | City | | |
| | | State | ☐ 1-Arizona ☐ 2-California<br>☐ 3-Colorado ☐ 4-New Mexico<br>☐ 5-Utah ☐ 6-Mexico<br>☐ 7 - other (write) _____ | ☐ 1-Arizona ☐ 2-California<br>☐ 3-Colorado ☐ 4-New Mexico<br>☐ 5-Utah ☐ 6-Mexico<br>☐ 7-other (write) _____ |
| What is your main purpose for going there? | | | ☐ 1 - home ☐ 2 - work<br>☐ 3 - work-rel. ☐ 4 - delivery<br>☐ 5 - school ☐ 6 - recreation<br>☐ 7 - shop ☐ 8 - eat<br>☐ 9 - social ☐ 10-pick-up/drop<br>☐ 11-other off passenger<br>➥(write) _____ | ☐ 1 - home ☐ 2 - work<br>☐ 3 - work-rel. ☐ 4 - delivery<br>☐ 5 - school ☐ 6 - recreation<br>☐ 7 - shop ☐ 8 - eat<br>☐ 9 - social ☐ 10-pick-up/drop<br>☐ 11-other off passenger<br>➥(write) _____ |

Figure 4

Questionnaire Number: 1

# MARICOPA ASSOCIATION OF GOVERNMENTS
# EXTERNAL TRAVEL SURVEY — COMMERCIAL TRUCK

Station Location: I-10 South of Hunt Highway Station #: 17 Date 10//12/1999

Interviewer: _____ Day of Week: Tue

| | | | Vehicle 1 | Vehicle 2 |
|---|---|---|---|---|
| Time: | | | ☐ 1 - a.m. ☐ 2 - p.m. | ☐ 1 - a.m. ☐ 2 - p.m. |
| Vehicle Type | | | ☐ 1 - step-van ☐ 2 - bus<br>Single unit truck<br>☐ 3 - 2 axles ☐ 4 - 3+axles<br>Combination truck<br>☐ 5 - 1 trailer ☐ 6 - 2+ trailers | ☐ 1 - step-van ☐ 2 - bus<br>Single unit truck<br>☐ 3 - 2 axles ☐ 4 - 3+axles<br>Combination truck<br>☐ 5 - 1 trailer ☐ 6 - 2+ trailers |
| Type of Load<br><br>(*Specify the product each truck is hauling) | | | ☐ 1 - Empty<br>☐ 2 - Mixed* ☐ 3 - Bulk*<br>☐ 4 - Liquid* ☐ 5 - Other*<br>(product)_____ | ☐ 1 - Empty<br>☐ 2 - Mixed* ☐ 3 - Bulk*<br>☐ 4 - Liquid* ☐ 5 - Other*<br>(product)_____ |
| What is the name of the place where this vehicle garaged? (e.g., Ryder Trucks, FedEx, ...)<br><br>And, what is the address there? (or intersecting streets--get something!!) | | Place Name | | |
| | | Street Address | ____ ____ _____ ____<br>Number Dir Street Type | ____ ____ _____ ____<br>Number Dir Street Type |
| | | City | | |
| | | State | ☐ Arizona<br>☐ Other (write)_____ | ☐ Arizona<br>☐ Other (write)_____ |
| | | ZIP Code | | |
| What is the primary type of business of the company for which you are driving this truck? (Select only ONE type!) | | | ☐1 - Agriculture ☐2 - Forestry<br>☐3 - Mine/Quarry ☐4 - Constr.<br>☐5 - Manufac. ☐6 - Retail<br>☐7 - Wholesale ☐8 - Utilities<br>☐9 - Government ☐10-Service<br>☐11 -For-hire/shipping<br>☐12 -Daily Rental<br>☐13 -Other: _____ | ☐1 - Agriculture ☐2 - Forestry<br>☐3 - Mine/Quarry ☐4 - Constr.<br>☐5 - Manufac. ☐6 - Retail<br>☐7 - Wholesale ☐8 - Utilities<br>☐9 - Government ☐10-Service<br>☐11 -For-hire/shipping<br>☐12 -Daily Rental<br>☐13 -Other: _____ |
| Was the last place you stopped in Maricopa County? (See Map)<br><br>(Be Specific and get something, McDonalds, Safeway, cross streets, etc.) | IF YES: | Place Name | | |
| | | Street Address | ____ ____ _____ ____<br>Number Dir Street Type | ____ ____ _____ ____<br>Number Dir Street Type |
| | | Intersecting Streets | ____ _____ ____<br>Dir Street Type<br>& ____ _____ ____<br>Dir Street Type | ____ _____ ____<br>Dir Street Type<br>& ____ _____ ____<br>Dir Street Type |
| | | City & ZIP Code | _____ _____<br>City Zip Code | _____ _____<br>City Zip Code |
| | | What was your main purpose for being there? | ☐ 1 - Pick-up ☐ 2 - Delivery<br>☐ 3 - Shop/Fuel ☐ 4 - Eat<br>☐ 5 - Sleep/Rest ☐ 6 - Work<br>☐ 7 - Base/Terminal<br>☐ 8 - Vehicle Maintenance<br>☐ 9 - Other: _____ | ☐ 1 - Pick-up ☐ 2 - Delivery<br>☐ 3 - Shop/Fuel ☐ 4 - Eat<br>☐ 5 - Sleep/Rest ☐ 6 - Work<br>☐ 7 - Base/Terminal<br>☐ 8 - Vehicle Maintenance<br>☐ 9 - Other: _____ |
| | IF NO: | How did you enter Maricopa County? (What station number or Road?) | Station Number _____<br>or<br>Road _____ | Station Number _____<br>or<br>Road _____ |
| To what city or area are you going next? | | City | | |
| | | State | ☐ 1 - Arizona ☐ 2 - California<br>☐ 3 - Colorado ☐ 4 - New Mexico<br>☐ 5 - Utah ☐ 6 - Mexico<br>☐ 7 - Other (write) _____ | ☐ 1 - Arizona ☐ 2 - California<br>☐ 3 - Colorado ☐ 4 - New Mexico<br>☐ 5 - Utah ☐ 6 - Mexico<br>☐ 7 - Other (write) _____ |
| What will be your main purpose for being there? | | | ☐ 1 - Pick-up ☐ 2 - Delivery<br>☐ 3 - Shop/Fuel ☐ 4 - Eat<br>☐ 5 - Sleep/Rest ☐ 6 - Work<br>☐ 7 - Base/Terminal<br>☐ 8 - Vehicle Maintenance<br>☐ 9 - Other: _____ | ☐ 1 - Pick-up ☐ 2 - Delivery<br>☐ 3 - Shop/Fuel ☐ 4 - Eat<br>☐ 5 - Sleep/Rest ☐ 6 - Work<br>☐ 7 - Base/Terminal<br>☐ 8 - Vehicle Maintenance<br>☐ 9 - Other: _____ |

At the end of the day, approximately half an hour before sunset, the site supervisor would instruct the interview staff to exit from the survey area and would give the traffic control subcontractor permission to begin picking up signs and cones. Radios, clipboards, and unused forms were collected. The survey area was reviewed to ensure that all litter was picked up, the traffic control removed, and conditions restored to normal.

The traffic control performed generally as expected. Unfortunately, the posted speed reductions were not realized at many of the locations. The Arizona Department of Public Safety (DPS) was contacted prior to the start of the surveys to determine whether an off-duty officer with a police vehicle could help enforce the speed limit reductions. However, after consideration, the DPS declined to participate in the surveys.

Temperatures during the survey were generally over 100 degrees. The high temperatures had the potential to cause problems such as heat exhaustion and dehydration for the survey crew. Additional steps were taken to minimize these problems. Cold drinking water and beverages were provided and, if necessary, vehicles were run with the air conditioners on to provide a cool place for the surveyors to rest. There were no serious heat-related problems during the survey but there were some instances where extended breaks were required for members of the crew.

There was only one minor incident during the survey period. The incident was the result of motorist actions outside the control of the surveyors. The site supervisor prepared the following short report at the time of the incident:

> *Site 1: SR 85 at Patterson Road* – At this site, three vehicles entered the survey area. The first vehicle stopped and the second vehicle was not paying attention and tried a panic stop but struck the first vehicle. The third vehicle stopped in time and was not involved. The site was immediately shut down after the incident at approximately 3:35 PM. The two drivers stated that they were uninjured, exchanged business cards and left the survey site. The survey area was kept closed while statements from the surveyors were taken and the survey resumed at 4:00 PM.

While not stated above, it was reported that the driver of the second vehicle was talking on a cell phone when he struck the first vehicle.

There were no vehicle queues resulting from the surveys. Queue formation was a major concern of the permitting agencies during the approval process. It was agreed beforehand that had queues developed, the survey would be temporarily suspended until such time as the queue dissipated.

At some of the medium volume sites, only one flagger was originally planned. A second flagger was added at these sites to provide more positive direction to approaching vehicles and reduce driver confusion. The second flagger was generally positioned in the gore area (where the survey lane diverges from the through lane).

At the higher volume interstate sites, the flaggers did not use the gore areas because of the higher volumes and speeds. Because safety was the primary concern at these sites, the flaggers diverted vehicles from the shoulders. This resulted in a reduced sampling rate at some of the interstate sites. When the interstate volume was particularly high, it was difficult to divert the required number vehicles out of the mainline flow of traffic into the survey area. An effort was made to pull the trailing vehicles in a platoon rather than the first

vehicles. For larger queues, pulling the lead vehicle often led to more vehicles stopping than were needed. Generally, only vehicles in the right-most lane were directed to exit to minimize lane-changing conflicts between vehicles.

At several survey locations, there were high volumes of trucks. In some cases these same trucks repeatedly passed the survey location over the course of the day. In these instances, the trucks were interviewed in the morning and then were allowed to pass the survey site the rest of the day without being stopped.

## Data Editing, Coding, and Checks

While the survey was in progress, the site supervisor collected and reviewed the completed forms every hour. This provided an opportunity to monitor interviewer accuracy and correct errors "on-the-fly." The completed survey forms were further reviewed and edited in the office to correct for obvious spelling errors and legibility. Edits were done using a red pencil to call attention to any changes made to the original data.

After editing was complete and the data formats determined, the completed forms were transmitted to MAG for entry. Once the data were entered by MAG, they returned to the consulting staff for further checking. Error checking of the data was accomplished by using a database program to perform running queries to check data ranges, consistency internal to the record and between records, and reclassifying "other" categories where possible. After data entry, changes were recorded in a comment field in the data file for future reference.

The cleaned data were then transmitted back to MAG for geocoding (the process of assigning a latitude and longitude to the place information). MAG determined latitudes and longitudes for all 726 truck surveys and 6,146 auto surveys included in the final data. A variety of methods were used to geocode the data including:

- direct address matching,
- address matching using incomplete address information,
- geocoding of intersection information, manual geocoding based on descriptions of locations (e.g., "the McDonald's about five miles back on this road), and
- manual geocoding within large geographic areas (e.g., the only address information provided was "Scottsdale").

## Survey Factoring

Typically, when a survey of some sector of a population is conducted, it is impractical to ask each survey question of each member of that population. Therefore, a random sample of the population is surveyed, and these results are expanded to reflect the entire population. Key elements that should be observed for sample surveys are ensuring that the sample is random, and ensuring that sufficient valid samples are collected to meet statistical significance requirements. These elements could not be strictly adhered to for all survey sites (e.g., on interstate highway sites, safety concerns dictated that vehicles be selected from the right hand lane of the roadway). Nevertheless, it has been assumed that any biases introduced by not adhering to the elements were small.

Because traffic and travel vary over the course of the day, it was desirable to expand roadside survey data for different time periods of the day. In addition, separate expansion factors were calculated for automobiles (and other personal use vehicles such as minivans and pickup trucks), "medium" trucks (step vans, buses, and single unit trucks), and "heavy" trucks. (combination trucks). Time of day survey expansion factors for each of the three vehicle class were calculated using the following general relationship:

$$EF_{stc} = \frac{TV_{stc}}{VR_{stc}}$$

where: EF = expansion factor,
VR = the number of valid survey records,
TV = traffic volume,
s = survey site,
t = time period,
c = vehicle class.

Typically, a minimum value of 30 is suggested for the number of samples that can be assumed representative for a given time period. This value is based on the fact that with less than 30 samples, the distribution of responses may drift away from the normal distribution used in the determination of statistical significance. When fewer than 30 samples are used for statistical analyses, the Student's "t-statistic" should be used rather than statistics based upon the normal distribution.

The time period used for the expansion factoring process was one hour. In a number of cases, there were fewer than 30 surveyed vehicles of a specific type during the one-hour period, sometimes as few as one vehicle. Hourly expansion factors were determined even for cases where only one vehicle was surveyed during the hour. In cases where no vehicles were surveyed during the one-hour period, an hourly expansion factor was not estimated. Rather, the trips made by vehicles passing the point during the one-hour period were represented by the expansion of the vehicles passing through the survey site during the hours when surveys were collected to the vehicles passing through the survey site during the entire day (see below for additional explanation). The above procedure was used in an effort to obtain the most representative data for the entire day. However, care should be used when summarizing data for external stations where very few surveys were obtained for specific classes of vehicles (e.g., site 6 for heavy and medium trucks).

Tables 2, 3, and 4 show the results of the expansion factoring process. Table 2 summarizes the vehicle counts, Table 3 summarizes the number of surveys, and Table 4 summarizes the resulting expansion factors by time period and vehicle class for each of the survey sites. As can be seen in the Table 4, the resulting expansion factors range from less than 1.0 to 260. Cases where expansion factors were less than 1.0 implies that there were mismatches between classifications by mechanical counters and classifications by surveyors. Nevertheless, to ensure that total expanded vehicles match counts over the entire day, the expansion factors less than 1.0 were used with no adjustment.

Two secondary sets of expansion factors are shown in Table 4. The primary expansion factors by time period and vehicle class are useful for representing the characteristics of the traffic passing through the survey locations during the survey period. The survey period was during the daylight hours, and typically 10 to 12 hours long. The first secondary set of expansion factors (listed in the column headed "Survey Period to Daily Outbound" in Table 4) is used to expand the vehicles from the survey period to represent the vehicles passing through the survey location during a 24-hour period. The expansion factors are derived by simply dividing the total outbound traffic through the survey site during the 24-hour period by the outbound traffic passing through the station during the survey period. Counts were summarized only for hours when at least one survey was obtained. For example, in Table 2, a zero is shown for heavy trucks for the hour beginning at 8:00 AM for Site 1. During the survey day, 42 heavy trucks actually passed through the site during that hour. However, since no surveys were obtained from any of the heavy trucks during that hour, a zero was posted in Table 2. The "Survey Period Outbound" total for heavy trucks (362) for Site 1 excludes all hourly periods when no surveys were obtained. The "Daily Outbound" total (864) includes all heavy trucks passing through Site 1 during the 24-hour period.

The second set of secondary expansion factors (listed in the column headed "Daily Outbound to Daily 2-Way" in Table 4) is used to expand the outbound traffic passing through the survey sites to represent traffic passing through the sites in both directions. The expansion factors are derived by simply dividing the total traffic in both directions through the survey site during the 24-hour period by the outbound traffic passing through the station during the 24-hour period. As with the primary expansion factors, the second set of secondary expansion factors is stratified by vehicle class.

Each record in the external survey database is assumed to represent the number of trips specified by the primary expansion factor. In other words, a record with a primary expansion factor of 4.00 represents four trips with the characteristics reflected in the record. Summing expanded data using the primary expansion factors provides a picture of the traffic passing through each survey site during the survey period.

## Table 2
## Vehicle Counts[1]

| Station Number | Vehicle Type | Hour Beginning | | | | | | | | | | | | | Total | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | Survey Period Outbound | Daily Outbound | Daily Inbound |
| 1 | Auto | 0 | 87 | 121 | 119 | 137 | 110 | 128 | 134 | 156 | 166 | 179 | 166 | 0 | 1,503 | 2,119 | 1,936 |
| | Heavy | 0 | 35 | 0 | 53 | 45 | 48 | 46 | 42 | 46 | 47 | 0 | 0 | 0 | 362 | 864 | 717 |
| | Medium | 0 | 9 | 8 | 9 | 10 | 3 | 5 | 6 | 4 | 7 | 6 | 0 | 0 | 67 | 108 | 73 |
| 2 | Auto | 0 | 5 | 6 | 4 | 2 | 4 | 3 | 3 | 2 | 4 | 4 | 10 | 0 | 47 | 89 | 82 |
| | Heavy | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 1 | 0 | 1 | 0 | 0 | 1 | 4 | 8 | 3 |
| | Medium | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 1 | 2 | 2 | 0 | 6 | 8 | 8 |
| 3 | Auto | 10 | 9 | 2 | 6 | 6 | 6 | 5 | 7 | 10 | 6 | 9 | 15 | 0 | 91 | 136 | 144 |
| | Heavy | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 7 | 4 |
| | Medium | 1 | 1 | 2 | 1 | 0 | 2 | 0 | 3 | 1 | 1 | 0 | 0 | 0 | 12 | 12 | 8 |
| 4 | Auto | 0 | 132 | 183 | 204 | 221 | 239 | 184 | 196 | 181 | 166 | 179 | 0 | 0 | 1,885 | 2,874 | 3,621 |
| | Heavy | 0 | 139 | 136 | 225 | 210 | 223 | 239 | 248 | 234 | 227 | 209 | 193 | 0 | 2,283 | 4,198 | 4,822 |
| | Medium | 0 | 8 | 7 | 7 | 15 | 10 | 18 | 8 | 7 | 6 | 9 | 0 | 0 | 95 | 192 | 367 |
| 5 | Auto | 0 | 22 | 20 | 31 | 32 | 42 | 48 | 38 | 30 | 49 | 42 | 29 | 0 | 383 | 532 | 526 |
| | Heavy | 0 | 0 | 0 | 0 | 4 | 0 | 0 | 2 | 2 | 4 | 0 | 0 | 0 | 12 | 33 | 27 |
| | Medium | 0 | 1 | 3 | 0 | 2 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 7 | 17 | 21 |
| 6 | Auto | 0 | 138 | 151 | 202 | 249 | 223 | 203 | 232 | 202 | 241 | 218 | 0 | 0 | 2,059 | 3,128 | 2,974 |
| | Heavy | 0 | 0 | 29 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 29 | 644 | 651 |
| | Medium | 0 | 0 | 0 | 0 | 21 | 0 | 0 | 0 | 0 | 24 | 0 | 0 | 0 | 45 | 301 | 115 |
| 7 | Auto | 0 | 674 | 767 | 1,085 | 1,097 | 888 | 842 | 887 | 973 | 1,039 | 1,049 | 0 | 0 | 9,301 | 14,306 | 12,779 |
| | Heavy | 0 | 80 | 97 | 102 | 114 | 130 | 119 | 90 | 103 | 88 | 89 | 0 | 0 | 1,012 | 1,838 | 2,317 |
| | Medium | 0 | 31 | 36 | 35 | 26 | 19 | 23 | 16 | 24 | 0 | 17 | 0 | 0 | 227 | 369 | 393 |
| 8 | Auto | 0 | 193 | 222 | 255 | 238 | 194 | 193 | 216 | 187 | 208 | 188 | 140 | 0 | 2,234 | 2,985 | 3,089 |
| | Heavy | 0 | 15 | 0 | 16 | 8 | 18 | 19 | 8 | 15 | 3 | 0 | 6 | 0 | 108 | 227 | 225 |
| | Medium | 0 | 0 | 6 | 9 | 6 | 5 | 7 | 0 | 5 | 0 | 0 | 6 | 0 | 44 | 96 | 69 |
| 10 | Auto | 0 | 600 | 548 | 488 | 529 | 573 | 553 | 624 | 655 | 688 | 705 | 639 | 0 | 6,602 | 9,581 | 13,636 |
| | Heavy | 0 | 49 | 30 | 35 | 47 | 42 | 34 | 30 | 0 | 0 | 0 | 0 | 0 | 267 | 530 | 975 |
| | Medium | 0 | 28 | 14 | 11 | 17 | 21 | 24 | 11 | 0 | 14 | 0 | 0 | 0 | 140 | 246 | 493 |
| 11 | Auto | 0 | 153 | 102 | 77 | 71 | 70 | 81 | 59 | 86 | 99 | 87 | 85 | 0 | 970 | 1,448 | 1,253 |
| | Heavy | 0 | 11 | 14 | 11 | 0 | 13 | 9 | 0 | 0 | 0 | 0 | 0 | 0 | 58 | 109 | 87 |
| | Medium | 0 | 7 | 2 | 4 | 0 | 1 | 3 | 0 | 0 | 5 | 0 | 0 | 0 | 22 | 46 | 167 |
| 12 | Auto | 34 | 37 | 28 | 30 | 35 | 36 | 42 | 44 | 58 | 78 | 85 | 64 | 0 | 571 | 816 | 762 |
| | Heavy | 0 | 1 | 7 | 4 | 0 | 0 | 7 | 3 | 0 | 0 | 0 | 0 | 0 | 22 | 51 | 82 |
| | Medium | 6 | 14 | 6 | 0 | 9 | 4 | 5 | 0 | 0 | 0 | 0 | 0 | 0 | 44 | 77 | 84 |
| 13 | Auto | 0 | 95 | 65 | 52 | 56 | 61 | 54 | 62 | 70 | 79 | 80 | 108 | 0 | 782 | 1,179 | 1,110 |
| | Heavy | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 7 | 0 | 0 | 0 | 0 | 0 | 8 | 64 | 80 |
| | Medium | 0 | 5 | 8 | 6 | 4 | 8 | 5 | 6 | 9 | 0 | 0 | 1 | 0 | 52 | 69 | 178 |
| 15 | Auto | 0 | 412 | 271 | 210 | 177 | 241 | 199 | 262 | 356 | 321 | 297 | 260 | 0 | 3,006 | 4,602 | 4,292 |
| | Heavy | 0 | 42 | 47 | 0 | 29 | 34 | 25 | 0 | 0 | 0 | 0 | 0 | 0 | 177 | 372 | 306 |
| | Medium | 0 | 0 | 27 | 33 | 0 | 35 | 26 | 37 | 30 | 0 | 0 | 0 | 0 | 188 | 345 | 155 |
| 16 | Auto | 0 | 464 | 1,035 | 945 | 942 | 814 | 802 | 759 | 901 | 932 | 1,047 | 1,089 | 0 | 9,730 | 14,589 | 14,992 |
| | Heavy | 0 | 109 | 189 | 241 | 0 | 302 | 260 | 239 | 207 | 198 | 0 | 0 | 0 | 1,745 | 4,282 | 3,767 |
| | Medium | 0 | 25 | 53 | 30 | 43 | 34 | 0 | 0 | 0 | 35 | 0 | 0 | 0 | 220 | 594 | 584 |
| 17 | Auto | 233 | 229 | 157 | 163 | 182 | 148 | 169 | 183 | 249 | 304 | 313 | 324 | 0 | 2,654 | 3,753 | 4,239 |
| | Heavy | 33 | 0 | 0 | 0 | 0 | 0 | 43 | 0 | 0 | 0 | 0 | 0 | 0 | 76 | 727 | 791 |
| | Medium | 0 | 15 | 0 | 27 | 23 | 0 | 0 | 24 | 0 | 15 | 0 | 0 | 0 | 104 | 261 | 343 |

[1] Counts were summarized only for hours when at least one survey was obtained. For example, for Site 1, a zero is shown for heavy trucks for the hour beginning at 8:00 AM. During the survey day, 42 heavy trucks actually passed through the site during that hour. However, since no surveys were obtained from any of the heavy trucks during that hour, a zero was posted.

## Table 3
## Survey Counts

| Station Number | Vehicle Type | Hour Beginning | | | | | | | | | | | | | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | |
| 1 | Auto | 0 | 23 | 28 | 33 | 46 | 36 | 34 | 38 | 36 | 33 | 41 | 1 | 0 | 349 |
| | Heavy | 0 | 2 | 0 | 3 | 2 | 1 | 6 | 1 | 5 | 2 | 0 | 0 | 0 | 22 |
| | Medium | 0 | 3 | 3 | 5 | 2 | 4 | 5 | 6 | 1 | 2 | 1 | 0 | 0 | 32 |
| 2 | Auto | 0 | 3 | 5 | 3 | 4 | 4 | 2 | 3 | 2 | 3 | 3 | 8 | 0 | 40 |
| | Heavy | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 3 | 0 | 1 | 0 | 0 | 1 | 7 |
| | Medium | 0 | 0 | 0 | 1 | 1 | 1 | 0 | 0 | 0 | 1 | 3 | 1 | 0 | 8 |
| 3 | Auto | 1 | 6 | 4 | 3 | 4 | 4 | 2 | 3 | 9 | 3 | 7 | 9 | 0 | 55 |
| | Heavy | 0 | 0 | 0 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 3 |
| | Medium | 1 | 1 | 1 | 1 | 0 | 2 | 0 | 1 | 3 | 1 | 0 | 0 | 0 | 11 |
| 4 | Auto | 0 | 11 | 24 | 30 | 35 | 37 | 48 | 37 | 39 | 28 | 41 | 0 | 0 | 330 |
| | Heavy | 0 | 6 | 19 | 33 | 29 | 31 | 23 | 21 | 26 | 28 | 16 | 2 | 0 | 234 |
| | Medium | 0 | 4 | 13 | 8 | 7 | 7 | 5 | 5 | 7 | 13 | 14 | 0 | 0 | 83 |
| 5 | Auto | 0 | 19 | 14 | 25 | 23 | 25 | 11 | 22 | 22 | 32 | 28 | 12 | 0 | 233 |
| | Heavy | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 1 | 2 | 1 | 0 | 0 | 0 | 6 |
| | Medium | 0 | 1 | 3 | 0 | 2 | 0 | 0 | 1 | 2 | 0 | 0 | 0 | 0 | 9 |
| 6 | Auto | 0 | 6 | 55 | 64 | 55 | 41 | 26 | 59 | 56 | 46 | 33 | 0 | 0 | 441 |
| | Heavy | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 |
| | Medium | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 2 |
| 7 | Auto | 0 | 107 | 123 | 94 | 124 | 56 | 105 | 123 | 99 | 82 | 39 | 0 | 0 | 952 |
| | Heavy | 0 | 3 | 2 | 5 | 2 | 2 | 1 | 3 | 2 | 2 | 2 | 0 | 0 | 24 |
| | Medium | 0 | 6 | 1 | 4 | 2 | 1 | 4 | 6 | 1 | 0 | 2 | 0 | 0 | 27 |
| 8 | Auto | 0 | 40 | 50 | 26 | 68 | 46 | 49 | 53 | 48 | 42 | 53 | 33 | 0 | 508 |
| | Heavy | 0 | 1 | 0 | 3 | 2 | 3 | 2 | 1 | 1 | 2 | 0 | 1 | 0 | 16 |
| | Medium | 0 | 0 | 2 | 5 | 5 | 1 | 1 | 0 | 2 | 0 | 0 | 1 | 0 | 17 |
| 10 | Auto | 0 | 72 | 85 | 60 | 77 | 92 | 83 | 86 | 103 | 90 | 104 | 55 | 0 | 907 |
| | Heavy | 0 | 1 | 4 | 1 | 3 | 4 | 5 | 1 | 0 | 0 | 0 | 0 | 0 | 19 |
| | Medium | 0 | 3 | 7 | 7 | 6 | 2 | 5 | 3 | 0 | 2 | 0 | 0 | 0 | 35 |
| 11 | Auto | 0 | 12 | 22 | 18 | 17 | 19 | 34 | 24 | 33 | 38 | 43 | 26 | 0 | 286 |
| | Heavy | 0 | 1 | 1 | 1 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 5 |
| | Medium | 0 | 1 | 1 | 1 | 0 | 1 | 2 | 0 | 0 | 1 | 0 | 0 | 0 | 7 |
| 12 | Auto | 5 | 11 | 18 | 16 | 16 | 19 | 15 | 19 | 26 | 30 | 33 | 13 | 0 | 221 |
| | Heavy | 0 | 1 | 1 | 1 | 0 | 0 | 2 | 1 | 0 | 0 | 0 | 0 | 0 | 6 |
| | Medium | 1 | 7 | 2 | 0 | 3 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 15 |
| 13 | Auto | 0 | 10 | 22 | 30 | 22 | 29 | 19 | 27 | 30 | 30 | 38 | 27 | 0 | 284 |
| | Heavy | 0 | 0 | 0 | 0 | 3 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 4 |
| | Medium | 0 | 4 | 10 | 3 | 2 | 2 | 4 | 3 | 5 | 0 | 0 | 1 | 0 | 34 |
| 15 | Auto | 0 | 51 | 39 | 37 | 37 | 45 | 29 | 29 | 67 | 46 | 57 | 22 | 0 | 459 |
| | Heavy | 0 | 1 | 2 | 0 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 6 |
| | Medium | 0 | 0 | 3 | 2 | 0 | 1 | 2 | 1 | 1 | 0 | 0 | 0 | 0 | 10 |
| 16 | Auto | 0 | 21 | 75 | 63 | 77 | 58 | 47 | 60 | 45 | 85 | 54 | 41 | 0 | 626 |
| | Heavy | 0 | 3 | 5 | 9 | 0 | 5 | 1 | 5 | 3 | 2 | 0 | 0 | 0 | 33 |
| | Medium | 0 | 1 | 3 | 2 | 10 | 1 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 18 |
| 17 | Auto | 9 | 25 | 44 | 39 | 28 | 33 | 40 | 56 | 45 | 47 | 54 | 35 | 0 | 455 |
| | Heavy | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 2 |
| | Medium | 0 | 2 | 0 | 1 | 2 | 0 | 0 | 1 | 0 | 1 | 0 | 0 | 0 | 7 |

## Table 4
## Expansion Factors

| Station Number | Vehicle Type | Hour Beginning | | | | | | | | | | | | | Survey Period to Daily Outbound | Daily Outbound to Daily Two-way |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | | |
| 1 | Auto | | 3.783 | 4.321 | 3.606 | 2.978 | 3.056 | 3.765 | 3.526 | 4.333 | 5.030 | 4.366 | 166.0 | | 1.410 | 1.914 |
| | Heavy | | 17.500 | | 17.667 | 22.500 | 48.000 | 7.667 | 42.000 | 9.200 | 23.500 | | | | 2.387 | 1.830 |
| | Medium | | 3.000 | 2.667 | 1.800 | 5.000 | 0.750 | 1.000 | 1.000 | 4.000 | 3.500 | 6.000 | | | 1.612 | 1.676 |
| 2 | Auto | | 1.667 | 1.200 | 1.333 | 0.500 | 1.000 | 1.500 | 1.000 | 1.000 | 1.333 | 1.333 | 1.250 | | 1.894 | 1.921 |
| | Heavy | | | | 1.000 | | | | 0.333 | | 1.000 | | | 1.000 | 2.000 | 1.375 |
| | Medium | | | | | | 1.000 | | | | 1.000 | 0.667 | 2.000 | | 1.333 | 2.000 |
| 3 | Auto | 10.000 | 1.500 | 0.500 | 2.000 | 1.500 | 1.500 | 2.500 | 2.333 | 1.111 | 2.000 | 1.286 | 1.667 | | 1.495 | 2.059 |
| | Heavy | | | | | 1.000 | 1.000 | | | | | | | | 3.500 | 1.571 |
| | Medium | 1.000 | 1.000 | 2.000 | 1.000 | | 1.000 | | 3.000 | 0.333 | 1.000 | | | | 1.000 | 1.667 |
| 4 | Auto | | 12.000 | 7.625 | 6.800 | 6.314 | 6.459 | 3.833 | 5.297 | 4.641 | 5.929 | 4.366 | | | 1.525 | 2.260 |
| | Heavy | | 23.167 | 7.158 | 6.818 | 7.241 | 7.194 | 10.391 | 11.810 | 9.000 | 8.107 | 13.063 | 96.500 | | 1.839 | 2.149 |
| | Medium | | 2.000 | 0.538 | 0.875 | 2.143 | 1.429 | 3.600 | 1.600 | 1.000 | 0.462 | 0.643 | | | 2.021 | 2.911 |
| 5 | Auto | | 1.158 | 1.429 | 1.240 | 1.391 | 1.680 | 4.364 | 1.727 | 1.364 | 1.531 | 1.500 | 2.417 | | 1.389 | 1.989 |
| | Heavy | | | | | 4.000 | | | 2.000 | 1.000 | 4.000 | | | | 2.750 | 1.818 |
| | Medium | | 1.000 | 1.000 | | 1.000 | | | | 0.500 | | | | | 2.429 | 2.235 |
| 6 | Auto | | 23.000 | 2.745 | 3.156 | 4.527 | 5.439 | 7.808 | 3.932 | 3.607 | 5.239 | 6.606 | | | 1.519 | 1.951 |
| | Heavy | | | 29.000 | | | | | | | | | | | 22.207 | 2.011 |
| | Medium | | | | | 21.000 | | | | | 24.000 | | | | 6.689 | 1.382 |
| 7 | Auto | | 6.299 | 6.236 | 11.543 | 8.847 | 15.857 | 8.019 | 7.211 | 9.828 | 12.671 | 26.897 | | | 1.538 | 1.893 |
| | Heavy | | 26.667 | 48.500 | 20.400 | 57.000 | 65.000 | 119.0 | 30.000 | 51.500 | 44.000 | 44.500 | | | 1.816 | 2.261 |
| | Medium | | 5.167 | 36.000 | 8.750 | 13.000 | 19.000 | 5.750 | 2.667 | 24.000 | | 8.500 | | | 1.626 | 2.065 |
| 8 | Auto | | 4.825 | 4.440 | 9.808 | 3.500 | 4.217 | 3.939 | 4.075 | 3.896 | 4.952 | 3.547 | 4.242 | | 1.336 | 2.035 |
| | Heavy | | 15.000 | | 5.333 | 4.000 | 6.000 | 9.500 | 8.000 | 15.000 | 1.500 | | 6.000 | | 2.102 | 1.991 |
| | Medium | | | 3.000 | 1.800 | 1.200 | 5.000 | 7.000 | | 2.500 | | | 6.000 | | 2.182 | 1.719 |
| 10 | Auto | | 8.333 | 6.447 | 8.133 | 6.870 | 6.228 | 6.663 | 7.256 | 6.359 | 7.644 | 6.779 | 11.618 | | 1.451 | 2.423 |
| | Heavy | | 49.000 | 7.500 | 35.000 | 15.667 | 10.500 | 6.800 | 30.000 | | | | | | 1.985 | 2.840 |
| | Medium | | 9.333 | 2.000 | 1.571 | 2.833 | 10.500 | 4.800 | 3.667 | | 7.000 | | | | 1.757 | 3.004 |
| 11 | Auto | | 12.750 | 4.636 | 4.278 | 4.176 | 3.684 | 2.382 | 2.458 | 2.606 | 2.605 | 2.023 | 3.269 | | 1.493 | 1.865 |
| | Heavy | | 11.000 | 14.000 | 11.000 | | 13.000 | 9.000 | | | | | | | 1.879 | 1.798 |
| | Medium | | 7.000 | 2.000 | 4.000 | | 1.000 | 1.500 | | | 5.000 | | | | 2.091 | 4.630 |
| 12 | Auto | 6.800 | 3.364 | 1.556 | 1.875 | 2.188 | 1.895 | 2.800 | 2.316 | 2.231 | 2.600 | 2.576 | 4.923 | | 1.429 | 1.934 |
| | Heavy | | 1.000 | 7.000 | 4.000 | | | 3.500 | 3.000 | | | | | | 2.318 | 2.608 |
| | Medium | 6.000 | 2.000 | 3.000 | | 3.000 | 4.000 | 5.000 | | | | | | | 1.750 | 2.091 |
| 13 | Auto | | 9.500 | 2.955 | 1.733 | 2.545 | 2.103 | 2.842 | 2.296 | 2.333 | 2.633 | 2.105 | 4.000 | | 1.508 | 1.941 |
| | Heavy | | | | | 0.333 | | | 7.000 | | | | | | 8.000 | 2.250 |
| | Medium | | 1.250 | 0.800 | 2.000 | 2.000 | 4.000 | 1.250 | 2.000 | 1.800 | | | 1.000 | | 1.327 | 3.580 |
| 15 | Auto | | 8.078 | 6.949 | 5.676 | 4.784 | 5.356 | 6.862 | 9.034 | 5.313 | 6.978 | 5.211 | 11.818 | | 1.531 | 1.933 |
| | Heavy | | 42.000 | 23.500 | | 29.000 | 34.000 | 25.000 | | | | | | | 2.102 | 1.823 |
| | Medium | | | 9.000 | 16.500 | | 35.000 | 13.000 | 37.000 | 30.000 | | | | | 1.835 | 1.449 |
| 16 | Auto | | 22.095 | 13.800 | 15.000 | 12.234 | 14.034 | 17.064 | 12.650 | 20.022 | 10.965 | 19.389 | 26.561 | | 1.499 | 2.028 |
| | Heavy | | 36.333 | 37.800 | 26.778 | | 60.400 | 260.0 | 47.800 | 69.000 | 99.000 | | | | 2.454 | 1.880 |
| | Medium | | 25.000 | 17.667 | 15.000 | 4.300 | 34.000 | | | | 35.000 | | | | 2.700 | 1.983 |
| 17 | Auto | 25.889 | 9.160 | 3.568 | 4.179 | 6.500 | 4.485 | 4.225 | 3.268 | 5.533 | 6.468 | 5.796 | 9.257 | | 1.414 | 2.129 |
| | Heavy | 33.000 | | | | | | 43.000 | | | | | | | 9.566 | 2.088 |
| | Medium | | 7.500 | | 27.000 | 11.500 | | | 24.000 | | 15.000 | | | | 2.510 | 2.314 |

The primary factors and secondary expansion factors were designed to work in concert with each other, depending on the summary being performed. If an estimate of the characteristics of the traffic leaving the area (through each survey site) is desired, each primary factor must be multiplied by the "Survey Period to Daily Outbound" secondary expansion factor prior to summarizing the data. Likewise, if an estimate of the total traffic passing through the survey site in both directions is desired, the primary expansion factor must be multiplied by both of the secondary expansion factors prior to summarizing the data.

Care must be used in summarizing and interpreting data when the composite expansion factors are used. Some summaries might be invalid. For example, while estimates of trips by trip purpose or the mix of daily trips made by residents and non-residents of the region would be valid, summaries of, say, the types of load carried by all commercial vehicles in both directions would be suspect. There would be no reason to expect commercial vehicles to carry the same commodity out of the region that they carried into the region.

Note that the expansion factors calculated using the methods above represent travel on the survey day. They have been calculated using both survey data and volume count data collected at the same time, which have not been factored or otherwise adjusted. In order to represent an average day, seasonal adjustments could also be applied to the expanded data. This would be analogous to the calculation of average daily traffic (ADT) and annualized average daily traffic (AADT) values from raw counts using daily and seasonal adjustment factors.

## Statistical Significance Review

Any results summarized from the Phoenix Area External Travel Survey are based on survey data and, as a result, are affected by inherent sampling error. When results are reported, such as 15 percent of the vehicles having a certain characteristic or the average auto occupancy of passenger vehicles being 1.68, the actual proportion of vehicles with that characteristic or the actual average auto occupancy might be higher or lower. Based on the sampling procedures used and number of samples collected, a statistical confidence level can be reported for each estimate produced. A brief discussion of statistical significance is presented below.

Whenever proportions of a survey are presented, the amount of sampling error can be determined as follows:

$$\sigma_p = \sqrt{\frac{pq}{n}}$$

where:

$\sigma_p$ is the standard error of the proportion, p
p is the proportion of the sample having a specific attribute
q is the proportion of the sample *not* having a specific attribute, or 1-p
n is the number of sampled elements

For example, for a proportion based on 350 sampled vehicles, the largest standard error occurs when p = 0.5

$$\sigma_p = \sqrt{\frac{0.5 \times 0.5}{350}}$$
$$= 0.0267$$

For one standard error of the estimate, the level of confidence is about 68 percent. For 95 percent confidence, the standard error must be multiplied by 1.96. So, for the example above, the proportion of the sample having the specific attribute is 0.5, we can say with 95 percent confidence that the true proportion of the sample is in the range:

$0.5 \pm 1.96 \times \sigma_p$, or
$0.5 \pm 0.052$

Confidence intervals can also be determined when average values are summarized. The actual confidence interval depends on the number of observations included in the sample and the variation of the item being measured. For example, suppose the average auto occupancy of all 6,146 autos surveyed is 1.68, and the standard deviation of that auto occupancy is 1.54. In this example, the relative error can be calculated as:

$$e = \frac{cv \times z}{\sqrt{n}}$$

where:

e is the percent error of the estimate
cv is the coefficient of variation, or the standard deviation divided by the mean
z is the normal variate, or 1.96 for the 95 percent confidence level
n is the number of observations

For the example above, the error associated with the average auto occupancy of 1.68, is ±0.023 persons, or ±1.36 percent at the 95 percent confidence level. In a statistical sense, this accuracy level says that if 100 independent random samples of 6,146 vehicles were taken (e.g., on 100 different days), 95 of the surveys would produce a mean within ±1.36 percent of 1.68 (i.e., in the range 1.657 to 1.703). Whenever, the sample size is reduced (e.g., to estimate the average auto occupancy at a single external station), the confidence interval will increase.

The original survey design was based, in part, on the desired statistical significance of the sample data for each survey site (see Appendix A). Target survey sample sizes for each site were based upon estimated traffic volumes at each site. Table 5 summarizes the actual statistical significance of the survey data for each site based upon the traffic counts taken during the survey period and the final numbers of completed, usable survey samples. Detailed summaries for each site are included in Appendix C.

Care must be used in interpreting the statistical significance levels shown in Table 5. For safety reasons, only vehicles leaving the region between just after sunrise to just before sunset were surveyed. Thus, the statistical significance levels are truly valid for only that time period. However, since the survey period normally included between 60 and 80 percent of the outbound traffic, the survey is considered to be “generally” valid for the entire day. Further, it is generally assumed that the inbound traffic is symmetrical to the outbound traffic.

**Table 5**
**Survey Samples and Statistical Significance**

| Site Number | Site Location | Surveyed Trips | Outbound Count | Percent of Outbound Traffic Surveyed | Confidence Interval[1] | Inbound Count |
|---|---|---|---|---|---|---|
| 1 | SR-85 at Patterson Road | 403 | 3,091 | 13.0% | ±0.05 | 2,726 |
| 2 | Old U.S. 80 at Gila River | 55 | 105 | 52.4% | ±0.09 | 93 |
| 3 | Salome Highway east of Courthouse Road | 69 | 155 | 44.5% | ±0.09 | 156 |
| 4 | I-10 at 477th Avenue | 647 | 7,264 | 8.9% | ±0.04 | 8,810 |
| 5 | U.S. 60 at 355th Avenue | 248 | 582 | 42.6% | ±0.05 | 574 |
| 6 | U.S. 93 at Maricopa/Yavapai County Boundary | 444 | 4,073 | 10.9% | ±0.04 | 3,740 |
| 7 | I-17 at Maricopa/Yavapai County Boundary | 1,003 | 16,513 | 6.1% | ±0.03 | 15,489 |
| 8 | SR-87/Beeline Highway east of Bush Highway | 541 | 3,308 | 16.4% | ±0.04 | 3,383 |
| 9 | SR-88 south of First Water Road | Counts Only | 1,156 | n/a | n/a | 1,086 |
| 10 | U.S. 60 about 3 miles southeast of Goldfield Road | 961 | 10,357 | 9.3% | ±0.03 | 15,104 |
| 11 | Ocotillo Road east of Meridian Road | 298 | 1,603 | 18.6% | ±0.05 | 1,507 |
| 12 | Rittenhouse Road at Combs Road | 242 | 944 | 25.6% | ±0.05 | 928 |
| 13 | Hunt Highway 1.7 miles east of Ellsworth Road | 322 | 1,312 | 24.5% | ±0.05 | 1,368 |
| 14 | Gilbert Road south of Hunt Highway | Counts Only | 1,029 | n/a | n/a | 1,066 |
| 15 | SR-87 at SR-87/SR-587 Junction | 475 | 5,319 | 8.9% | ±0.04 | 4,753 |
| 16 | I-10 south of Hunt Highway | 677 | 19,465 | 3.5% | ±0.04 | 19,343 |
| 17 | SR-347/Maricopa Road south of Hunt Highway | 464 | 4,741 | 9.8% | ±0.04 | 5,373 |

[1] The value shown is the confidence interval around a proportion of 0.5 at the 95 percent confidence level. For example, ±0.03 means that the true proportion would between 0.47 and 0.53 at the 95 percent confidence level.

## Results Summary

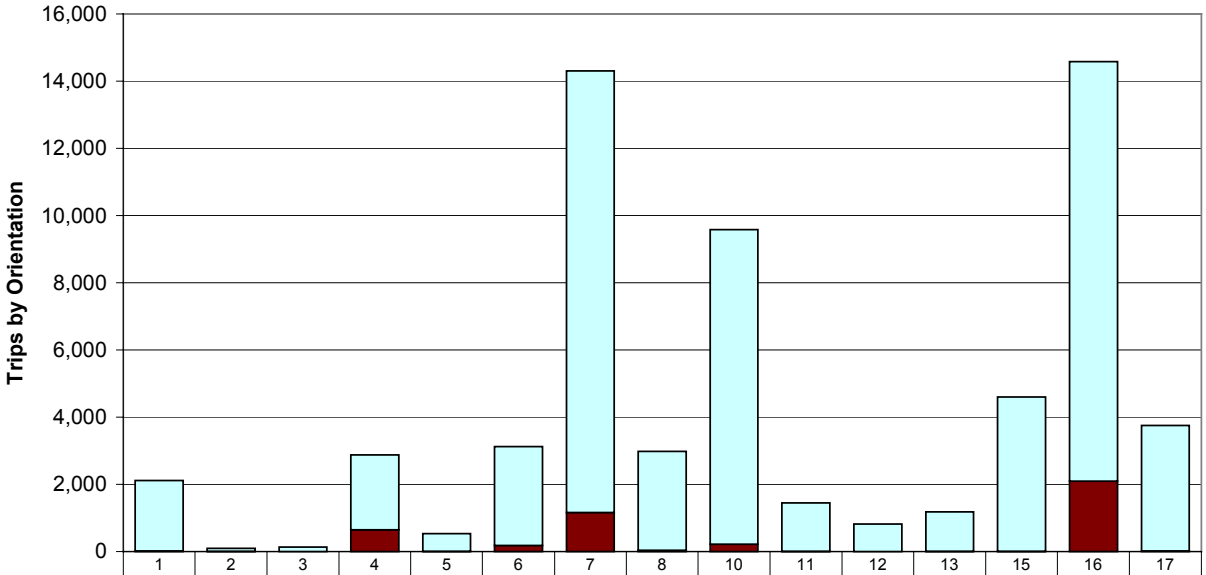
The following section provides some basic summaries of the external station survey data to provide a snapshot of the internal-external travel into and out of the region and external-external travel through the region.

Figures 5 through 10 summarize the numbers and percentages of internal-external and external-external trips by station for autos, trucks, and total vehicles. Figures 5, 7, and 9 show the absolute numbers of outbound auto trips, truck trips, and total vehicle trips while Figures 6, 8, and 10 show the composition of internal-external and external-external trips by station. Since only outbound trips were surveyed only the daily outbound information has been summarized.

As can be seen in Figures 6 and 8, about 93 percent of the auto trips passing through the external stations started within the study area while about 64 percent of the truck trips started within the study area. As shown in Figure 10, when autos and trucks are combined, about 87 percent of the trips began within the area.

As can be seen in Figures 6, 8, and 10, the proportions of internal-external trips vary substantially between stations. Some care must be used, however, in interpreting the results for trucks summarized in Figure 8 for several of the stations. Specifically, fewer than 20 actual truck surveys were collected at stations 2, 3, 5, 6, 11, 15, and 17. As shown in Figure 10, external-external trips comprise 20 percent or more of the trips at external station sites 4, 6, and 16. Sites 4 and 16 are I-10 on the west and south, respectively, and Site 6 is U.S. 93 at the Maricopa / Yavapai County boundary.

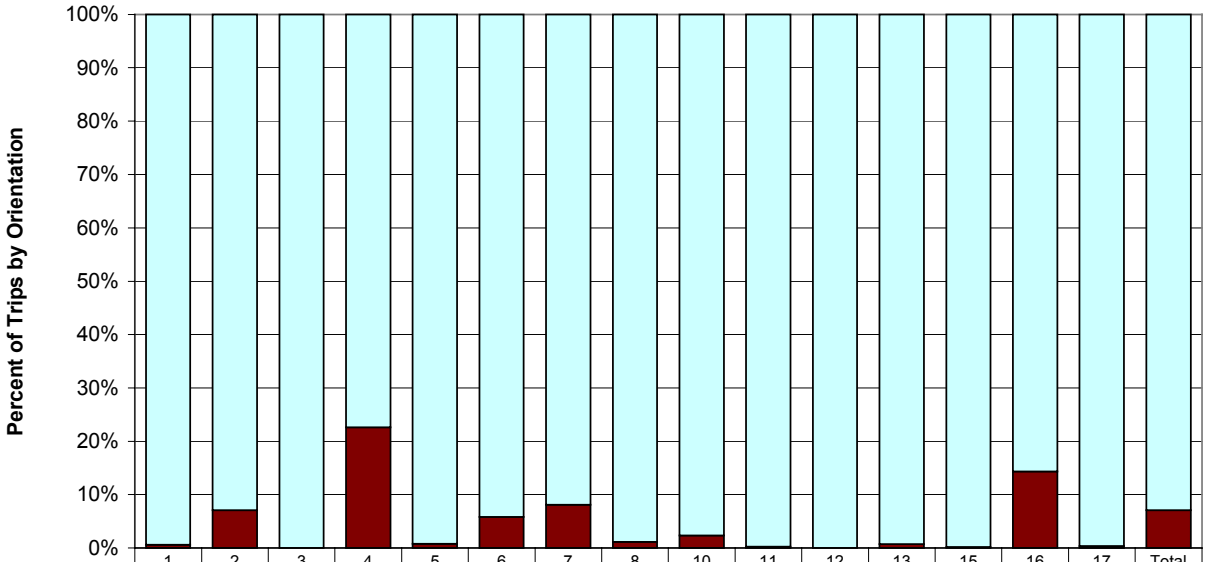
## Figure 5
## Outbound Auto Trips by Orientation by Station




| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 10 | 11 | 12 | 13 | 15 | 16 | 17 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| IE | 2,107 | 83 | 136 | 2,225 | 528 | 2,946 | 13,151 | 2,950 | 9,357 | 1,445 | 816 | 1,171 | 4,594 | 12,494 | 3,738 |
| EE | 12 | 6 | | 650 | 4 | 181 | 1,154 | 34 | 222 | 4 | | 8 | 8 | 2,091 | 15 |

Station

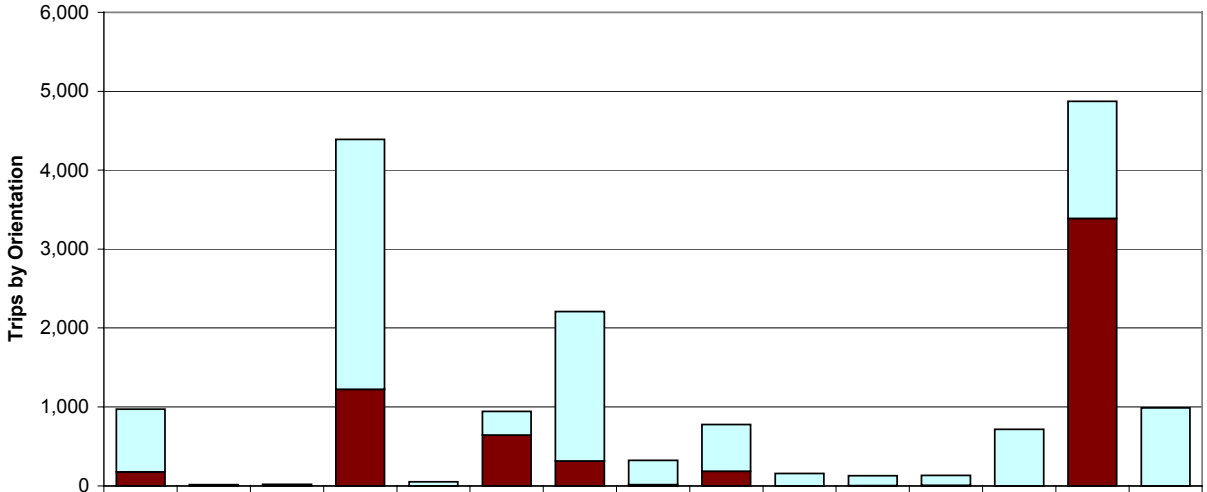
## Figure 6
## Percent of Outbound Auto Trips by Orientation by Station




| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 10 | 11 | 12 | 13 | 15 | 16 | 17 | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| IE | 99% | 93% | 100% | 77% | 99% | 94% | 92% | 99% | 98% | 100% | 100% | 99% | 100% | 86% | 100% | 93% |
| EE | 1% | 7% | 0% | 23% | 1% | 6% | 8% | 1% | 2% | 0% | 0% | 1% | 0% | 14% | 0% | 7% |

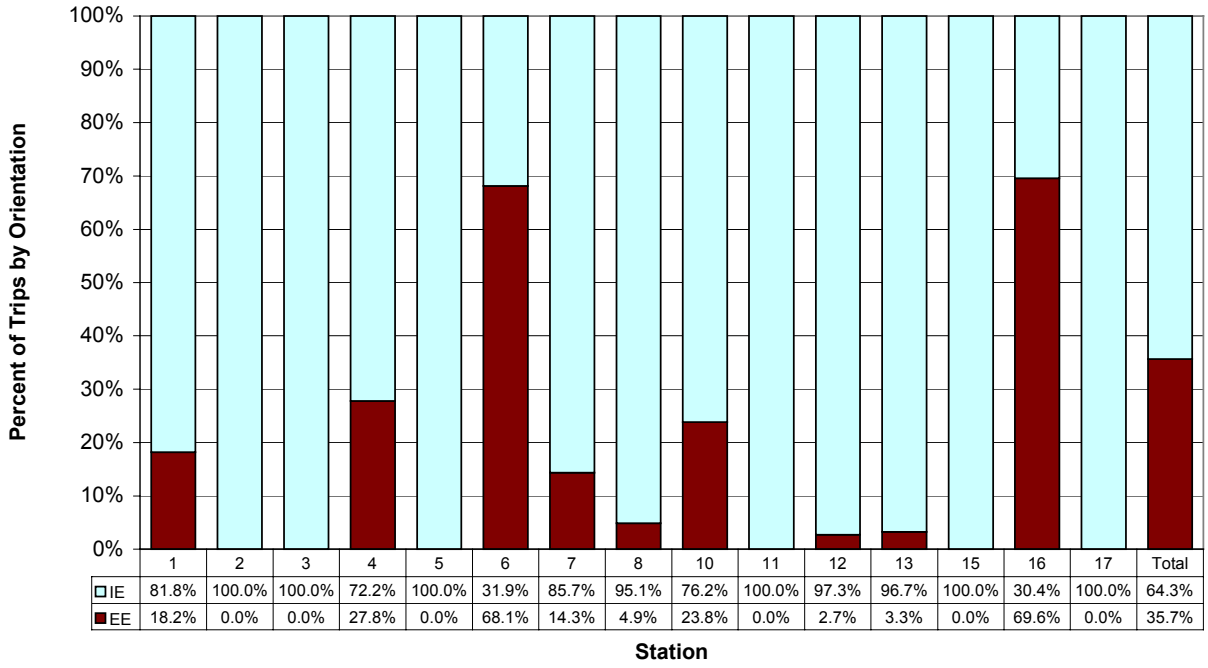
Station

## Figure 7
## Outbound Truck Trips by Orientation by Station



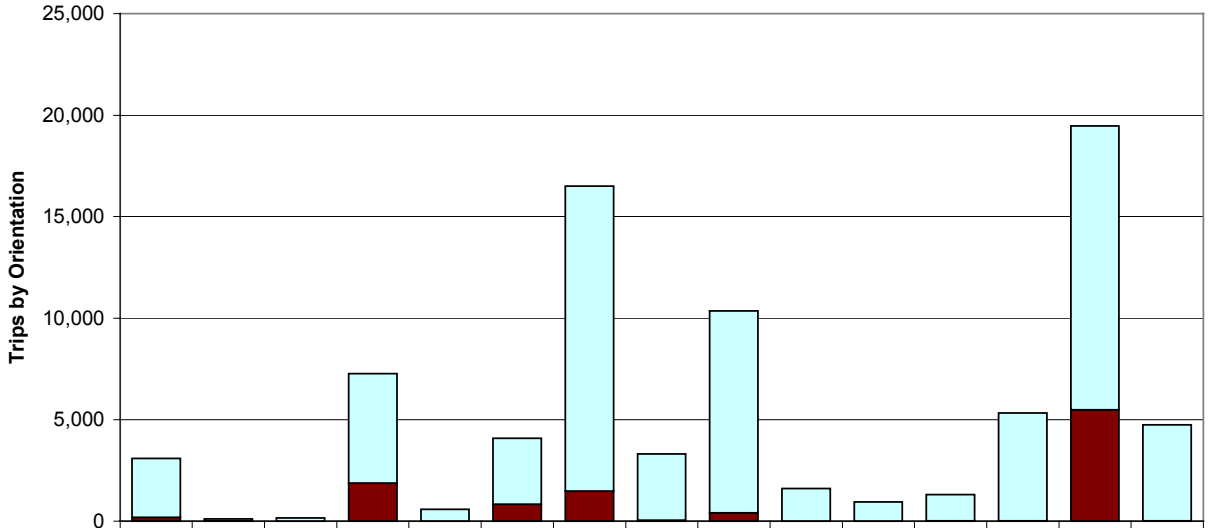

| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 10 | 11 | 12 | 13 | 15 | 16 | 17 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| IE | 795 | 16 | 19 | 3,169 | 50 | 301 | 1,891 | 307 | 591 | 155 | 124 | 129 | 717 | 1,485 | 988 |
| EE | 177 | | | 1,221 | | 644 | 316 | 16 | 185 | | 4 | 4 | | 3,391 | |

## Figure 8
## Percent of Outbound Truck Trips by Orientation by Station




| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 10 | 11 | 12 | 13 | 15 | 16 | 17 | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| IE | 81.8% | 100.0% | 100.0% | 72.2% | 100.0% | 31.9% | 85.7% | 95.1% | 76.2% | 100.0% | 97.3% | 96.7% | 100.0% | 30.4% | 100.0% | 64.3% |
| EE | 18.2% | 0.0% | 0.0% | 27.8% | 0.0% | 68.1% | 14.3% | 4.9% | 23.8% | 0.0% | 2.7% | 3.3% | 0.0% | 69.6% | 0.0% | 35.7% |

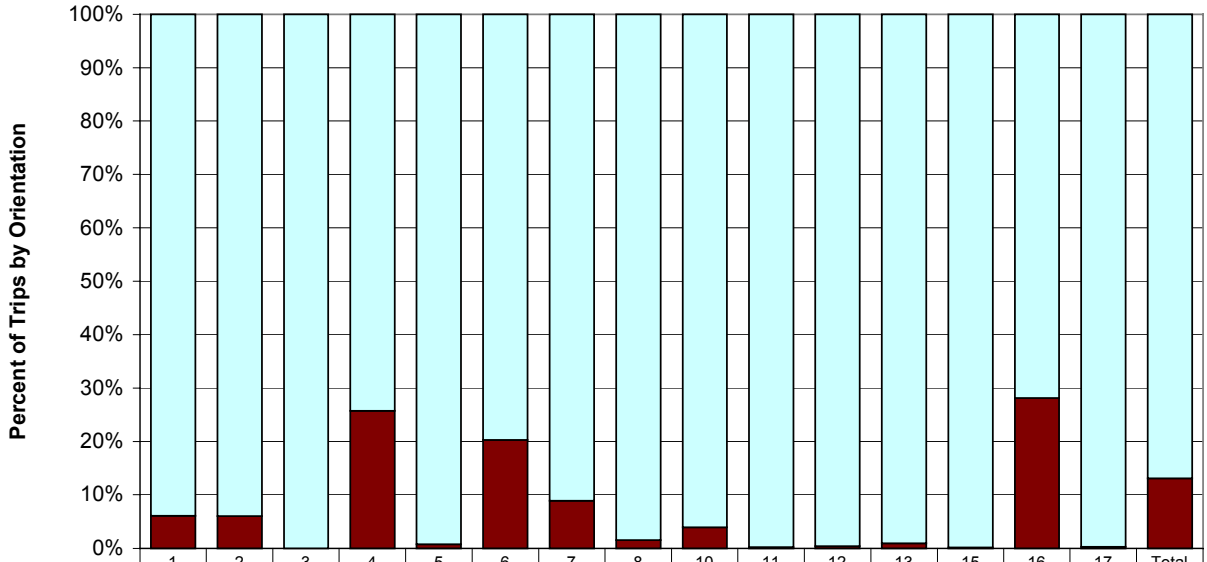
## Figure 9
## Outbound Total Trips by Orientation by Station




| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 10 | 11 | 12 | 13 | 15 | 16 | 17 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| IE | 2,902 | 99 | 155 | 5,394 | 578 | 3,247 | 15,042 | 3,257 | 9,948 | 1,600 | 941 | 1,300 | 5,311 | 13,979 | 4,726 |
| EE | 189 | 6 | 0 | 1,871 | 4 | 825 | 1,470 | 50 | 407 | 4 | 4 | 13 | 8 | 5,483 | 15 |

Station

## Figure 10
## Percent of Total Outbound Trips by Orientation by Station

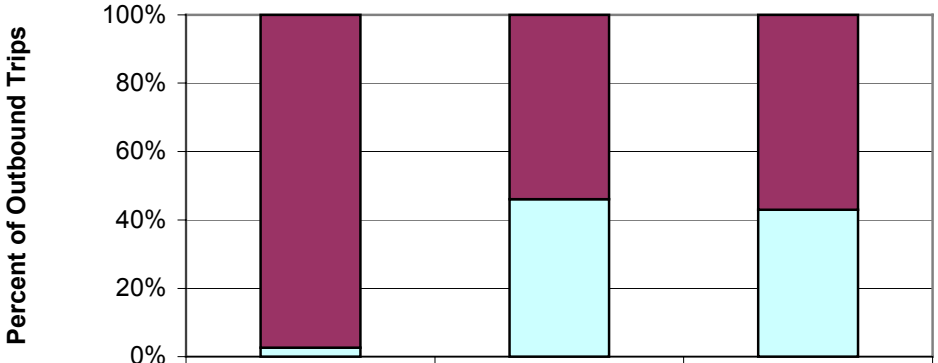



| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 10 | 11 | 12 | 13 | 15 | 16 | 17 | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| IE | 93.9% | 94.0% | 100.0% | 74.3% | 99.3% | 79.7% | 91.1% | 98.5% | 96.1% | 99.8% | 99.6% | 99.0% | 99.9% | 71.8% | 99.7% | 86.9% |
| EE | 6.1% | 6.0% | 0.0% | 25.7% | 0.7% | 20.3% | 8.9% | 1.5% | 3.9% | 0.2% | 0.4% | 1.0% | 0.1% | 28.2% | 0.3% | 13.1% |

Station

Figure 11 provides information about the residence location of travelers leaving the area in automobiles and other personal use vehicles. While the information was collected from only outbound travelers at the external survey sites, symmetry can be assumed. There is no reason to assume that inbound travelers would have any different characteristics. As can be seen in Figure 11, only three percent of the travelers passing through the study area are residents of Maricopa County, whereas residents of Maricopa County made 46 percent of the internal-external trips. These results are as should be expected.

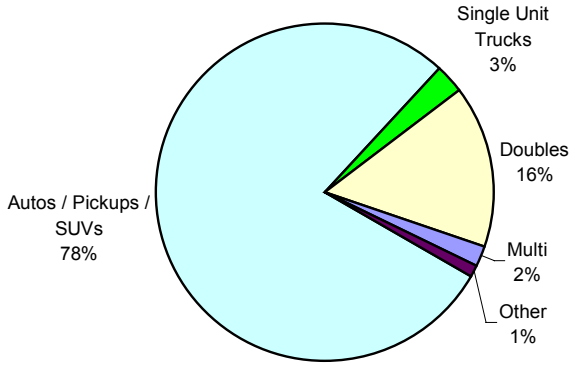
**Figure 11**
**Percent of Total Trips by**
**Residence Location of Trip Maker**




| | External-External | Internal-External | Total |
|---|---|---|---|
| Other | 97% | 54% | 57% |
| Maricopa | 3% | 46% | 43% |

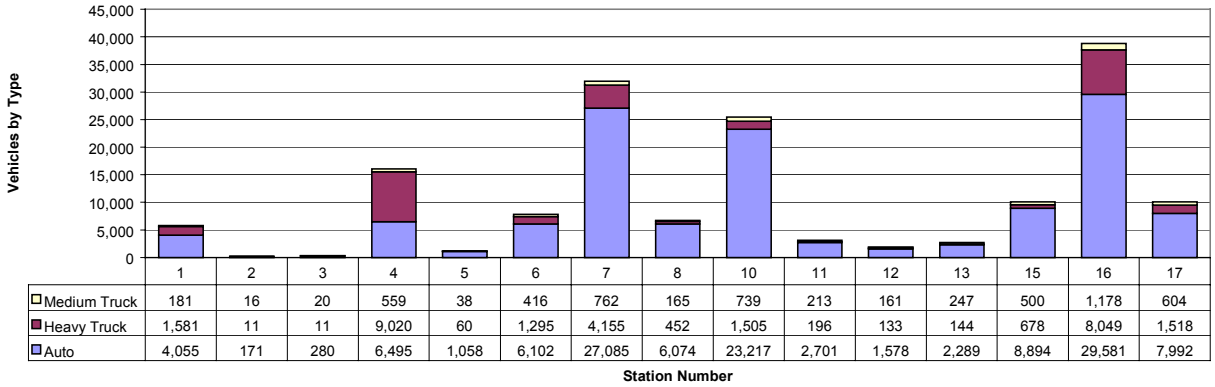
Figure 12 summarizes the proportions of inbound and outbound trips at all external stations by the type of vehicle making the trip. The information in Figure 12 was summarized from the mechanical classification counts performed at the external stations for the survey expansion. Passenger cars, pickups, minivans, and sport utility vehicles comprise almost 80 percent of the traffic at the external sites while single unit and multi-unit trucks comprise a little over 20 percent of the traffic. Other vehicles as summarized in Figure 12 include motorcycles and buses.

**Figure 12**
**Percent of Total Trips by Vehicle Type**



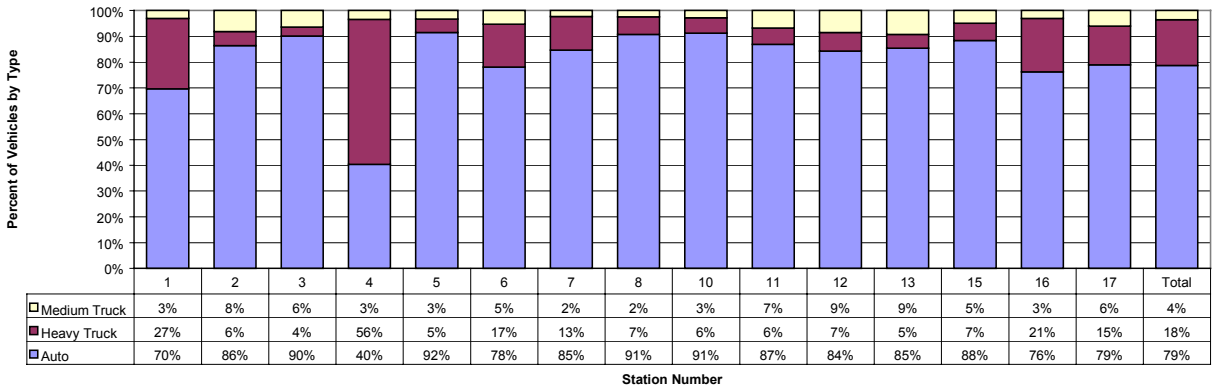
Figures 13 and 14 combine vehicles by type into the three broad categories used for expansion purposes: autos, medium trucks, and heavy trucks and summarizes the distributions of those vehicle types at each external survey site. As with Figure 12, Figures 13 and 14 are based on total traffic in both directions at each station as summarized from the classification counts taken at each station. As can be seen in Figure 14, the mix of vehicles varies substantially by site. It is interesting to note that trucks comprise about 60 percent of the traffic at the I-10 at 477th Avenue site (Site 4).

**Figure 13**
**Total Trips by Vehicle Type by Station**




| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 10 | 11 | 12 | 13 | 15 | 16 | 17 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Medium Truck | 181 | 16 | 20 | 559 | 38 | 416 | 762 | 165 | 739 | 213 | 161 | 247 | 500 | 1,178 | 604 |
| Heavy Truck | 1,581 | 11 | 11 | 9,020 | 60 | 1,295 | 4,155 | 452 | 1,505 | 196 | 133 | 144 | 678 | 8,049 | 1,518 |
| Auto | 4,055 | 171 | 280 | 6,495 | 1,058 | 6,102 | 27,085 | 6,074 | 23,217 | 2,701 | 1,578 | 2,289 | 8,894 | 29,581 | 7,992 |

**Figure 14**
**Percent of Total Trips by Vehicle Type by Station**

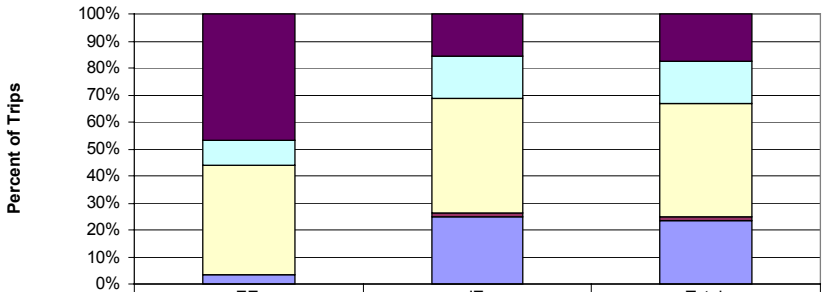



| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 10 | 11 | 12 | 13 | 15 | 16 | 17 | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Medium Truck | 3% | 8% | 6% | 3% | 3% | 5% | 2% | 2% | 3% | 7% | 9% | 9% | 5% | 3% | 6% | 4% |
| Heavy Truck | 27% | 6% | 4% | 56% | 5% | 17% | 13% | 7% | 6% | 6% | 7% | 5% | 7% | 21% | 15% | 18% |
| Auto | 70% | 86% | 90% | 40% | 92% | 78% | 85% | 91% | 91% | 87% | 84% | 85% | 88% | 76% | 79% | 79% |

Figure 15 summarizes the total outbound auto trips by the general purpose of the trip reported by the driver of the vehicle for both internal-external and external-external trips. General purposes were determined based upon the activities reported at the origin and the destination of the trip. All trips with home as either the origin or the destination were considered home-based trips. The home-based trip purpose was further subdivided based on the activity at the non-home end of the trip. Work and work-related activities were aggregated into the home-based work (HBW) trip purpose, school activities were assigned to the home-based school (HBSchool) trip purpose and all other activities were assigned to the home-based other (HBOther) trip purpose. Trips where neither end was home were

assigned to non-home-based trip purposes. The non-home-based trip purpose was subdivided into work-related and other. Work or work-related activities were reported for at least one end of non-home-based work-related (NHB-WR) trips. All non-home-based trips where neither end involved a work or work-related activity were assigned to the non-home-based other (NHB-O) trip purpose.

**Figure 15**
**Percent of Total Outbound Auto Trips by General Trip Purpose**




| | EE | IE | Total |
|---|---|---|---|
| NHB-O | 47% | 15% | 18% |
| NHB-WR | 9% | 16% | 15% |
| HBOther | 40% | 42% | 42% |
| HBSchool | 0% | 1% | 1% |
| HBW | 4% | 25% | 24% |

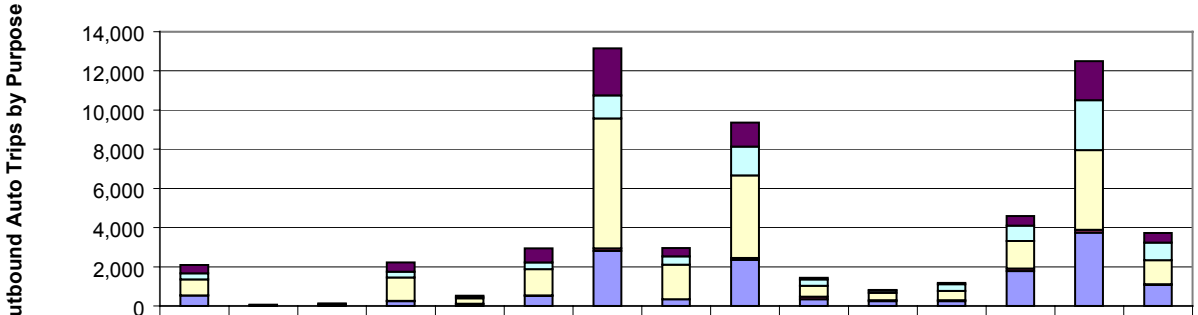
The distributions of trip purposes by trip orientation (external-external or internal-external) are substantially different. As would be expected, very few of the external-external trips are home-based work or home-based school. These trip purposes would be repeated with some regularity, so the typical long distances required for external-external trips would preclude many of these trips from being captured in an external station survey. The trips that were captured probably included infrequent home-based work-related trips to a site other than the normal work site, home-based work trips made to a remote site where the person would stay for multiple days, and shorter home-based work trips that "cut the corner" of the study area. Almost 90 percent of the external-external trips were home-based other or non-home-based other trips. These purposes include trips that would be made for recreational purposes.

The distribution of trips by purpose for internal-external trips mirrors distributions that are normally reported for regional (internal-internal) trip making. Typically, home-based work trips comprise 15 to 25 percent of the travel made by households in the region, home-based other trips (including home-based school trips) comprise 40 to 50 percent of the travel, and non-home-based trips comprise 25 to 35 percent of the travel. When home-based school trips are summarized separately from home-based other trips for a region, the home-based school proportion is typically between 5 and 10 percent of the regional travel.

Figures 16 and 17 summarize the numbers and percentages of trips by trip purpose for each station. Only outbound internal-external trips have been included in Figures 16 and 17 since they represent trips that might be made on a more consistent basis into and out of the region. The number and percentages of trips by purpose vary substantially among the stations. Home-based work trips provide a pertinent example since they can be expected to

be made with the most regularity. The percentages of home-based work trips vary from about 11 percent at station 4 to almost 40 percent at station 15. The home-based work trip percentages tend to be high at the stations on the southeast border of the MAG area.

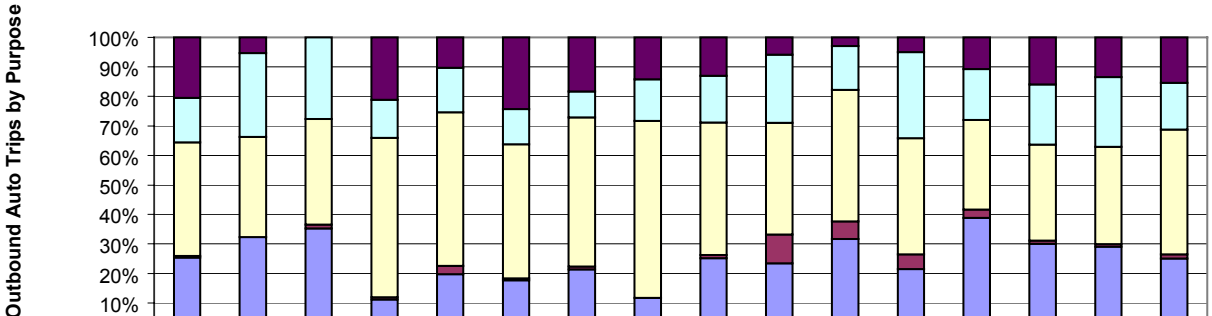
**Figure 16**
**Outbound Internal-External Auto Trips by Trip Purpose**




| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 10 | 11 | 12 | 13 | 15 | 16 | 17 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| NHB-0 | 433 | 4 | 0 | 471 | 55 | 715 | 2,405 | 420 | 1,218 | 86 | 24 | 58 | 496 | 1,990 | 501 |
| NHB-W | 316 | 23 | 38 | 286 | 79 | 350 | 1,163 | 416 | 1,476 | 332 | 121 | 342 | 788 | 2,556 | 887 |
| HBOther | 812 | 28 | 49 | 1,201 | 274 | 1,340 | 6,637 | 1,766 | 4,203 | 547 | 364 | 461 | 1,397 | 4,057 | 1,232 |
| HBSchool | 11 | 0 | 2 | 18 | 15 | 20 | 129 | 0 | 100 | 141 | 48 | 59 | 128 | 140 | 31 |
| HBWork | 535 | 27 | 48 | 249 | 104 | 521 | 2,818 | 348 | 2,360 | 338 | 259 | 252 | 1,785 | 3,751 | 1,088 |

Station Number

**Figure 17**
**Percent of Outbound Internal-External Auto Trips by Trip Purpose**




| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 10 | 11 | 12 | 13 | 15 | 16 | 17 | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| NHB-0 | 21% | 5% | 0% | 21% | 10% | 24% | 18% | 14% | 13% | 6% | 3% | 5% | 11% | 16% | 13% | 15% |
| NHB-W | 15% | 28% | 28% | 13% | 15% | 12% | 9% | 14% | 16% | 23% | 15% | 29% | 17% | 20% | 24% | 16% |
| HBOther | 39% | 34% | 36% | 54% | 52% | 45% | 50% | 60% | 45% | 38% | 45% | 39% | 30% | 32% | 33% | 42% |
| HBSchool | 1% | 0% | 1% | 1% | 3% | 1% | 1% | 0% | 1% | 10% | 6% | 5% | 3% | 1% | 1% | 1% |
| HBWork | 25% | 32% | 35% | 11% | 20% | 18% | 21% | 12% | 25% | 23% | 32% | 21% | 39% | 30% | 29% | 25% |

Station Number

Figure 18 summarizes the percentages of outbound auto trips by auto occupancy. As can be seen, over one-half of the auto trips had only the driver as an occupant. The average

auto occupancy of the outbound trips, 1.65 persons per auto, is higher than average auto occupancies normally observed in metropolitan areas. The auto occupancy is, however, quite reasonable for internal-external and external-external trip making.

**Figure 18**
**Percent of Total Outbound Auto Trips by Auto Occupancy**

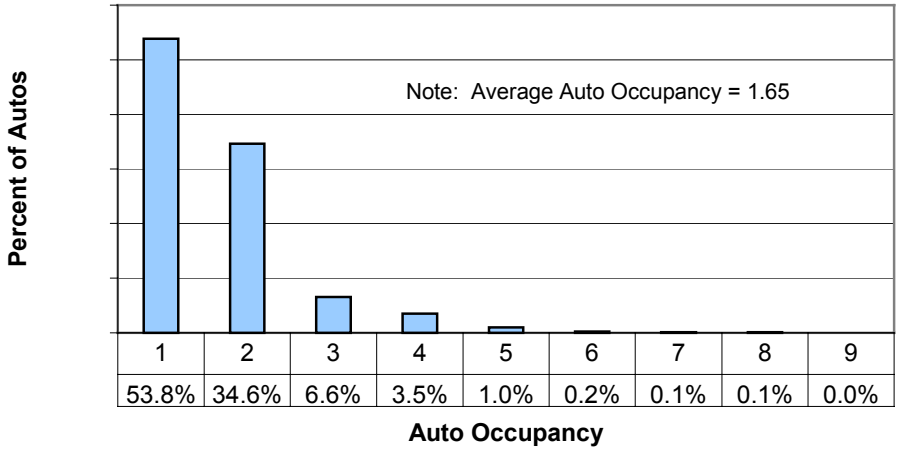
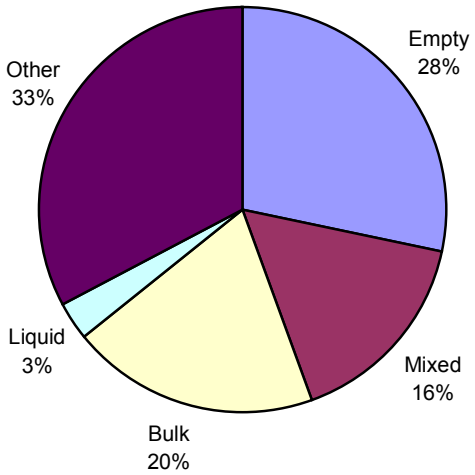



Figure 19 summarizes the distribution of load types carried by outbound trucks. The bulk category includes all unpackaged dry commodities such as cement, coal, dry chemicals, etc. The mixed category includes all packaged materials such as computers, grocery items, etc. The liquid category is used for all tanker trucks. The other category includes all other commodities such as cattle, auto transports, heavy equipment transports, etc. Perhaps the most interesting item summarized in Figure 19 is that over one-fourth of the trucks traveling through the external station sites were empty.

**Figure 19**
**Percent of Total Outbound Truck Trips by Load Type**



Figures 20 through 22 show the distributions of internal-external origins throughout the region for autos, heavy trucks, and medium trucks, respectively. Figure 23 shows a composite of the internal-external origins of all three vehicle types. As can be seen in Figure 20, internal-external auto trip origins are relatively well dispersed throughout the region. There is some clustering along the major transportation corridors and several concentration points near some of the stations. As shown in Figures 21 and 22, heavy and medium truck trip origins tend to be more clustered than the internal-external origins of autos. Many of the heavy truck trip origins tend to be clustered around I-10 and I-17 in central Phoenix. These concentrations are logical and can probably be correlated with major industrial and warehousing areas. Figure 23 is similar to Figure 20 since there are substantially more internal-external auto trips than truck trips.

**Figure 20**
**Origins of Internal-External Auto Trips**

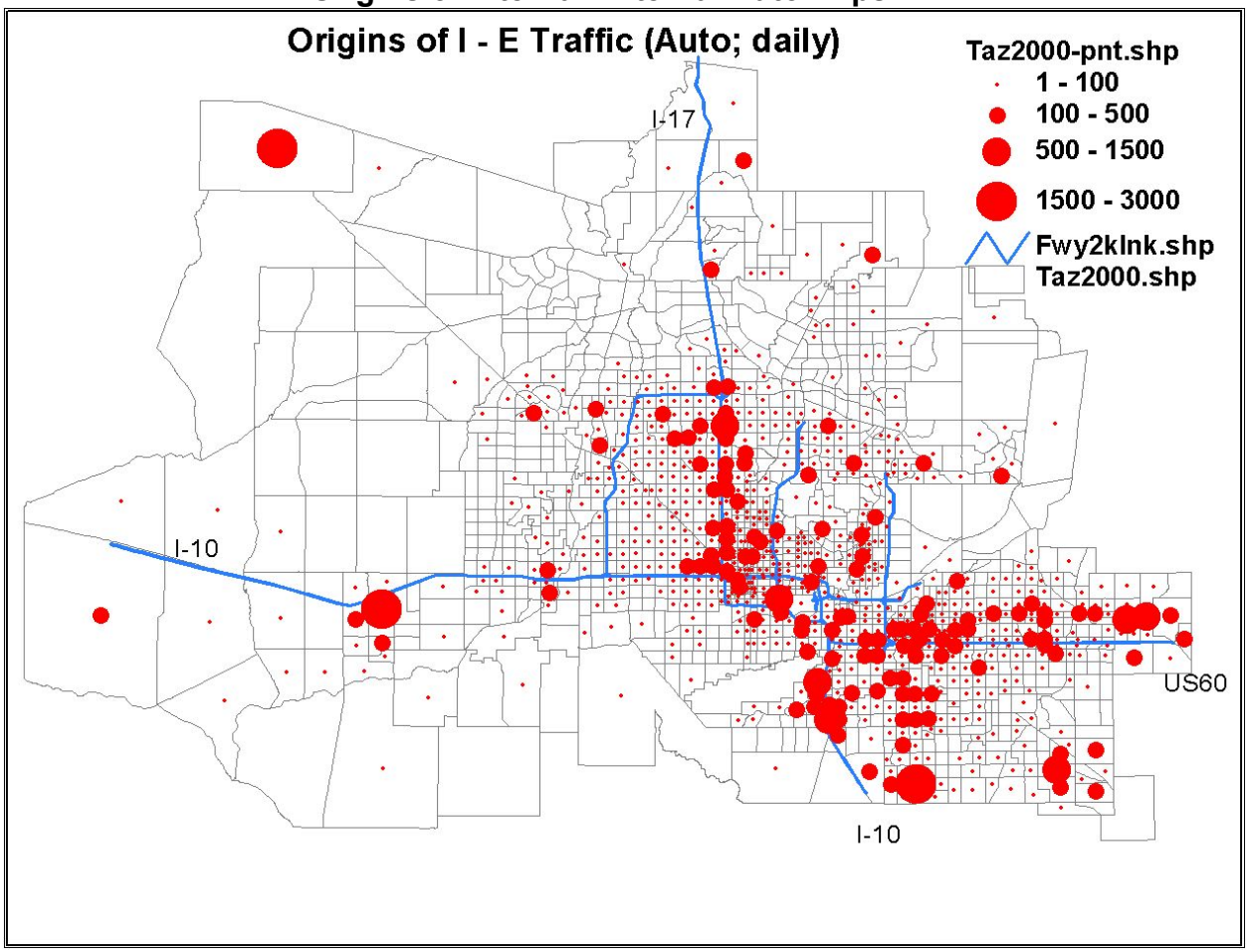


**Figure 21**
**Origins of Internal-External Heavy Truck Trips**

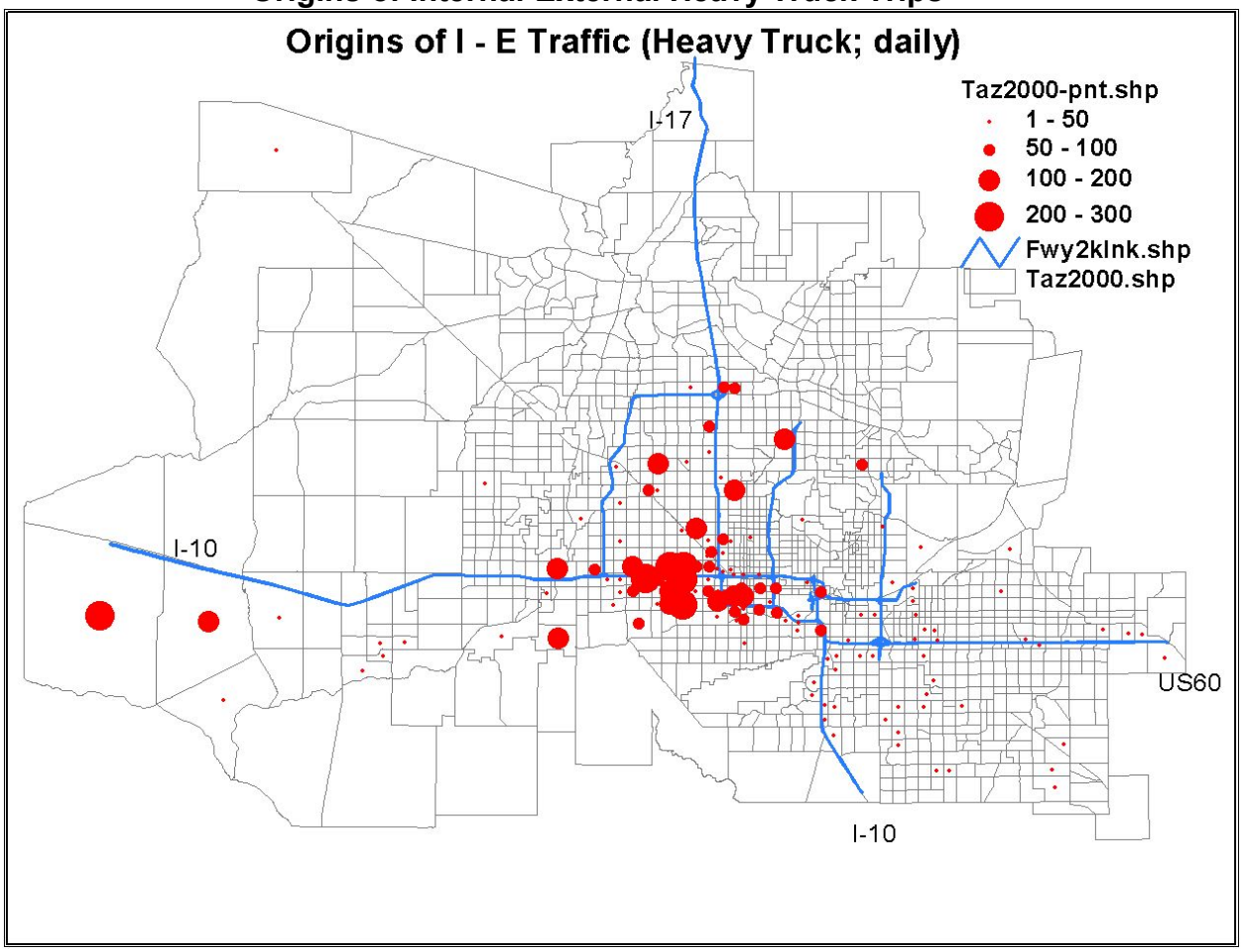


**Figure 22**
**Origins of Internal-External Medium Truck Trips**

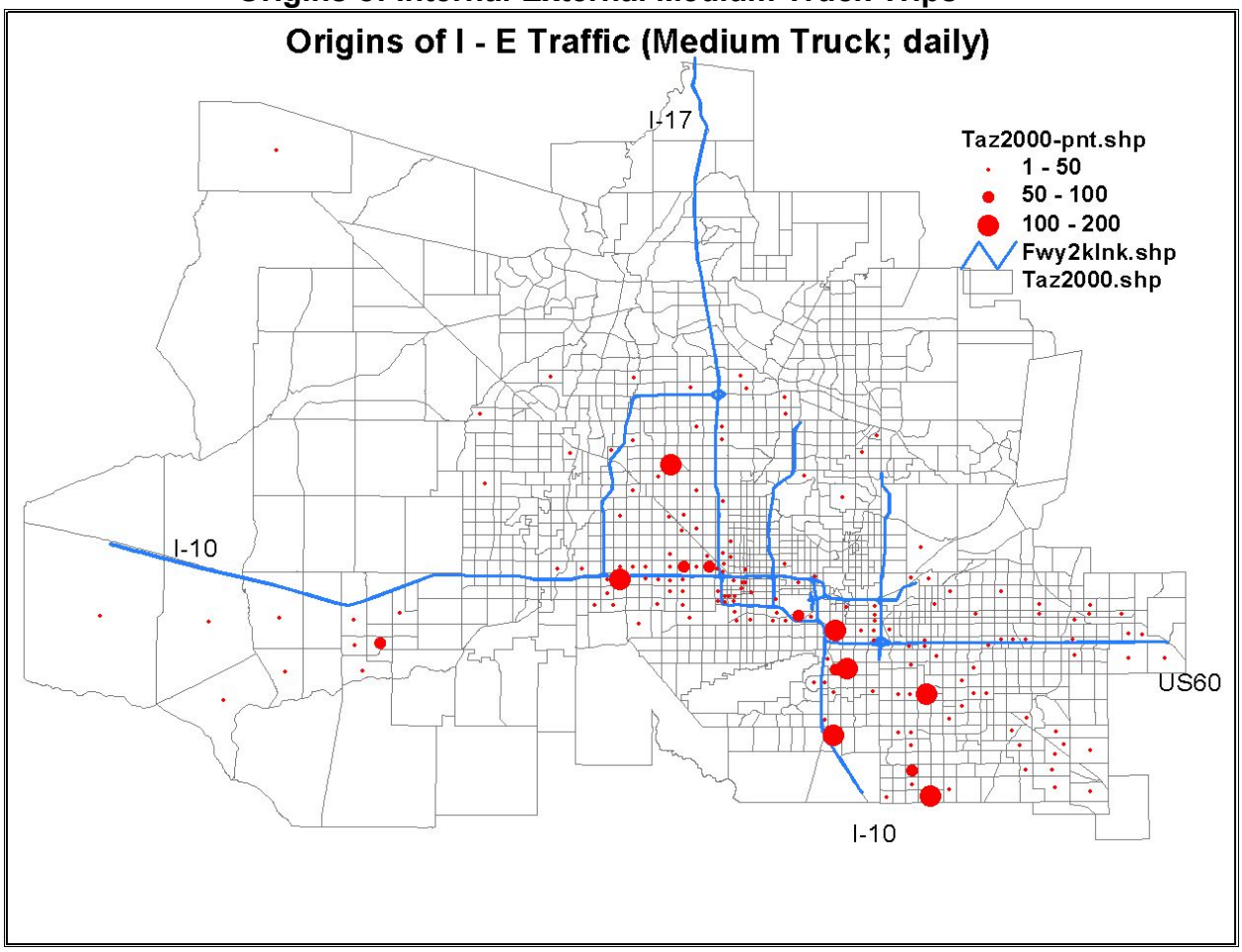
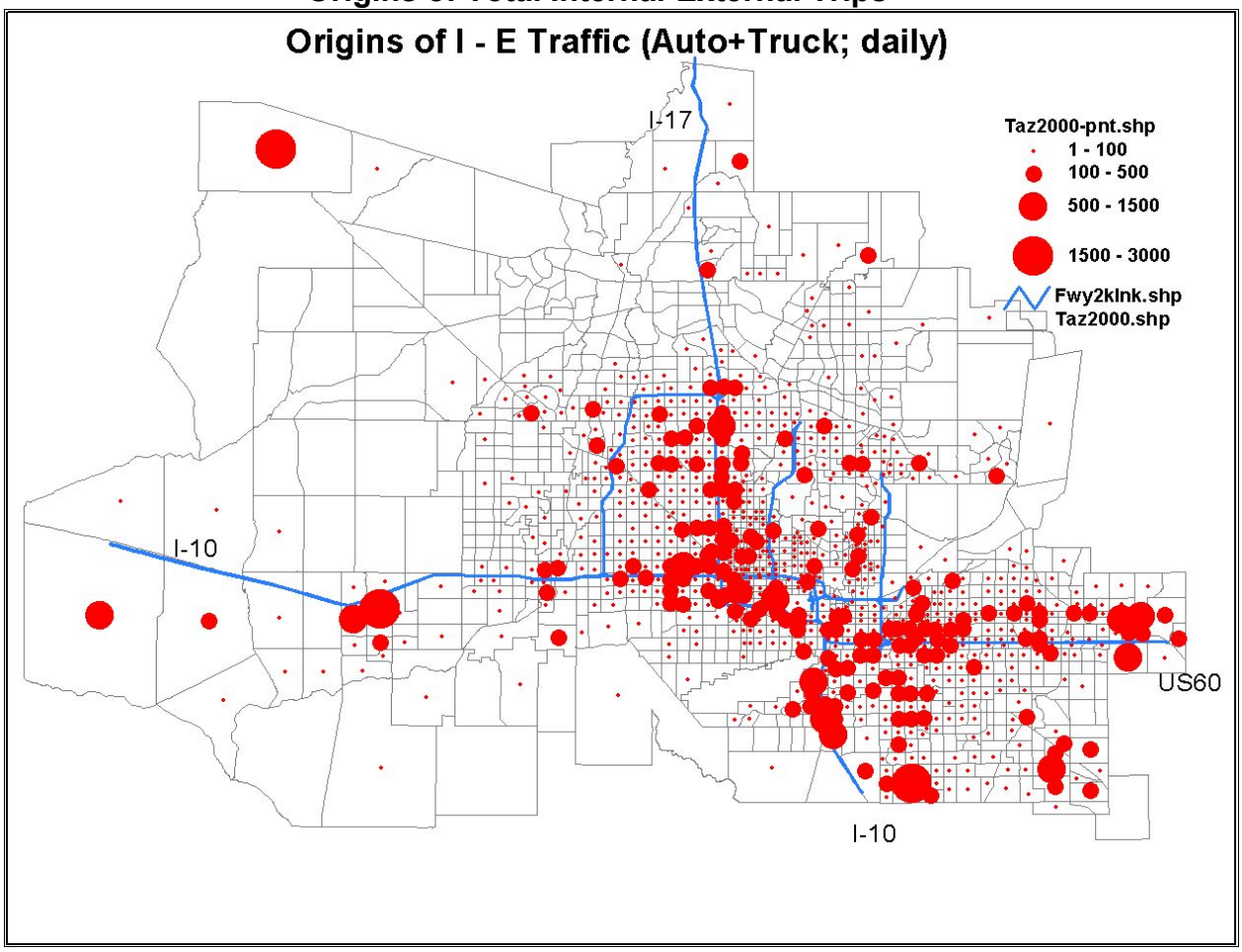


**Figure 23**
**Origins of Total Internal-External Trips**




Figures 24 through 26 show the destinations reported by drivers of vehicles leaving the region. Destinations for both internal-external and external-external travel are shown for all vehicle types in Figures 24 through 26. The primary destinations outside of the MAG region are in Pinal and Yavapai Counties, followed by Pima and Coconino Counties (see Figure 25). Within Pinal County, the major destinations are Casa Grande, Kings Ranch, and Queen Creek. The major destinations within Yavapai County are Prescott and Black Canyon. The close proximity of Kings Ranch, Queen Creek, and Black Canyon to the MAG regional travel modeling area suggests that close attention should be paid to those areas over time. In the future, methods for modeling trips to and from those areas might need revision to treat them more like "internal" zones rather than modeling trips to and from those areas through external stations.

Figure 26 shows the nationwide destinations of trips leaving the MAG region. Texas and California are the primary destinations followed by Nevada, New Mexico, and Mexico. The destinations suggest and east-west flow through of traffic through the MAG region as might be expected due to the continuity of I-10.

**Figure 24**
**Destinations of Internal-External and External-External Trips**
**Neighboring Counties**

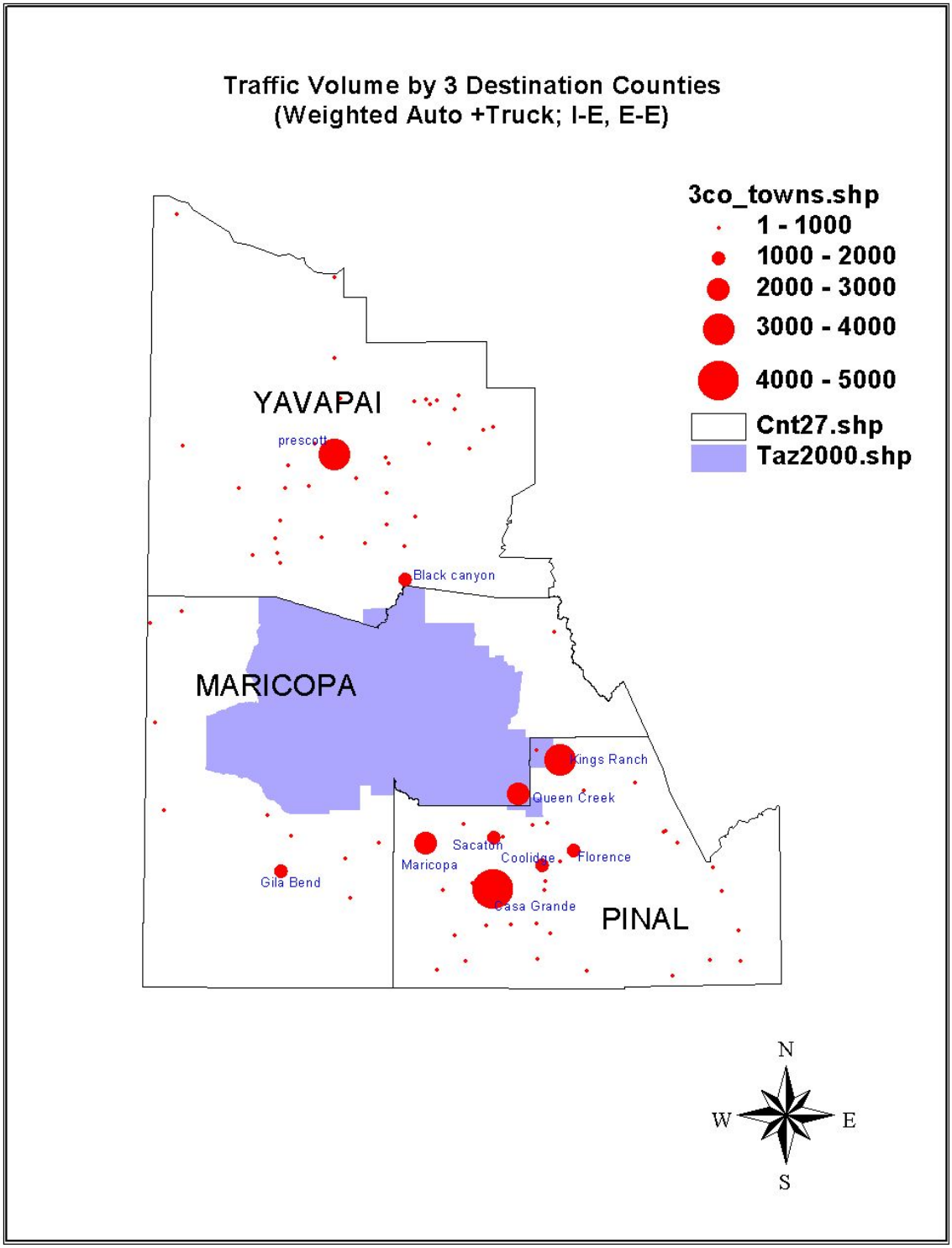


**Figure 25**
**Destinations of Internal-External and External-External Trips**
**All Arizona Counties**

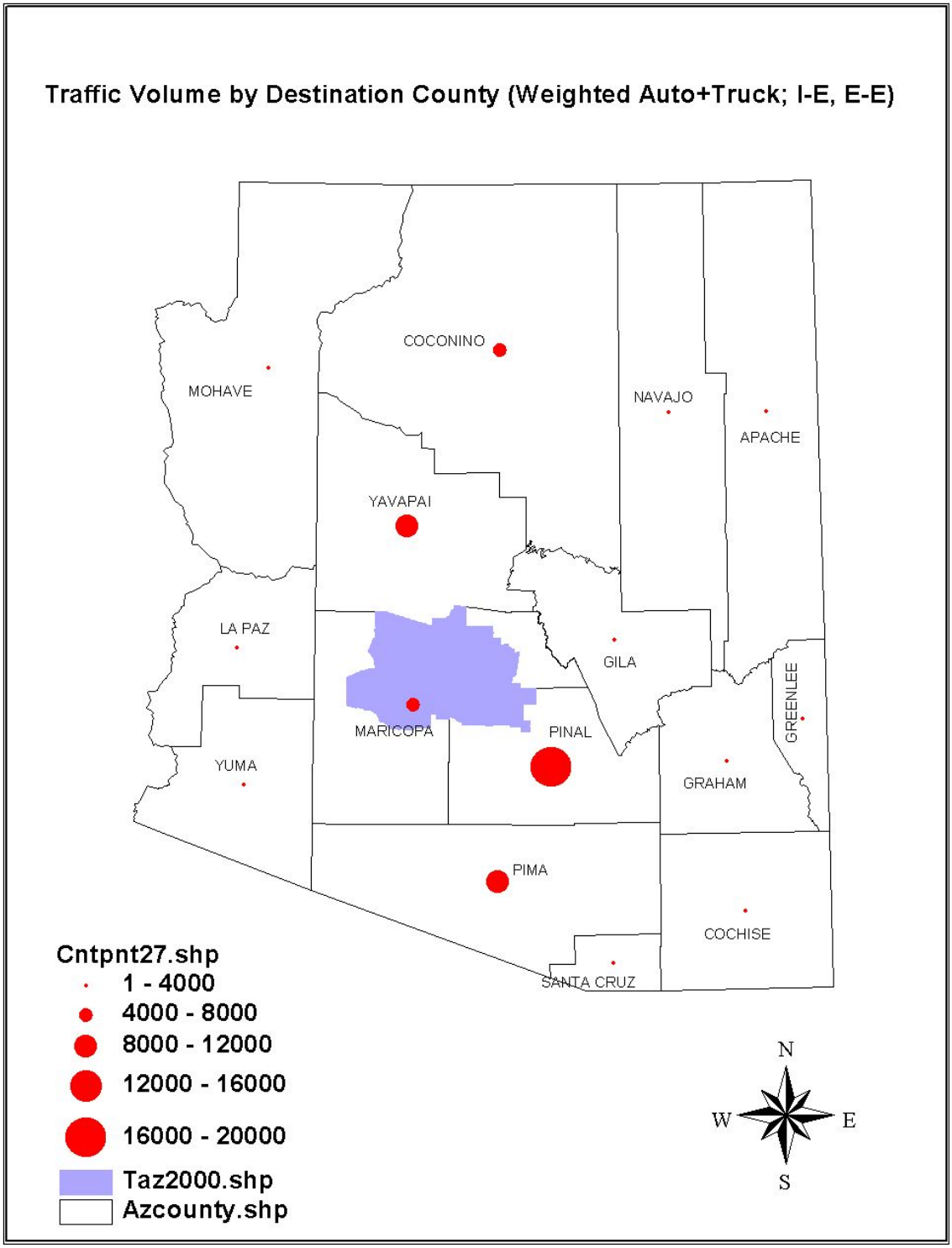
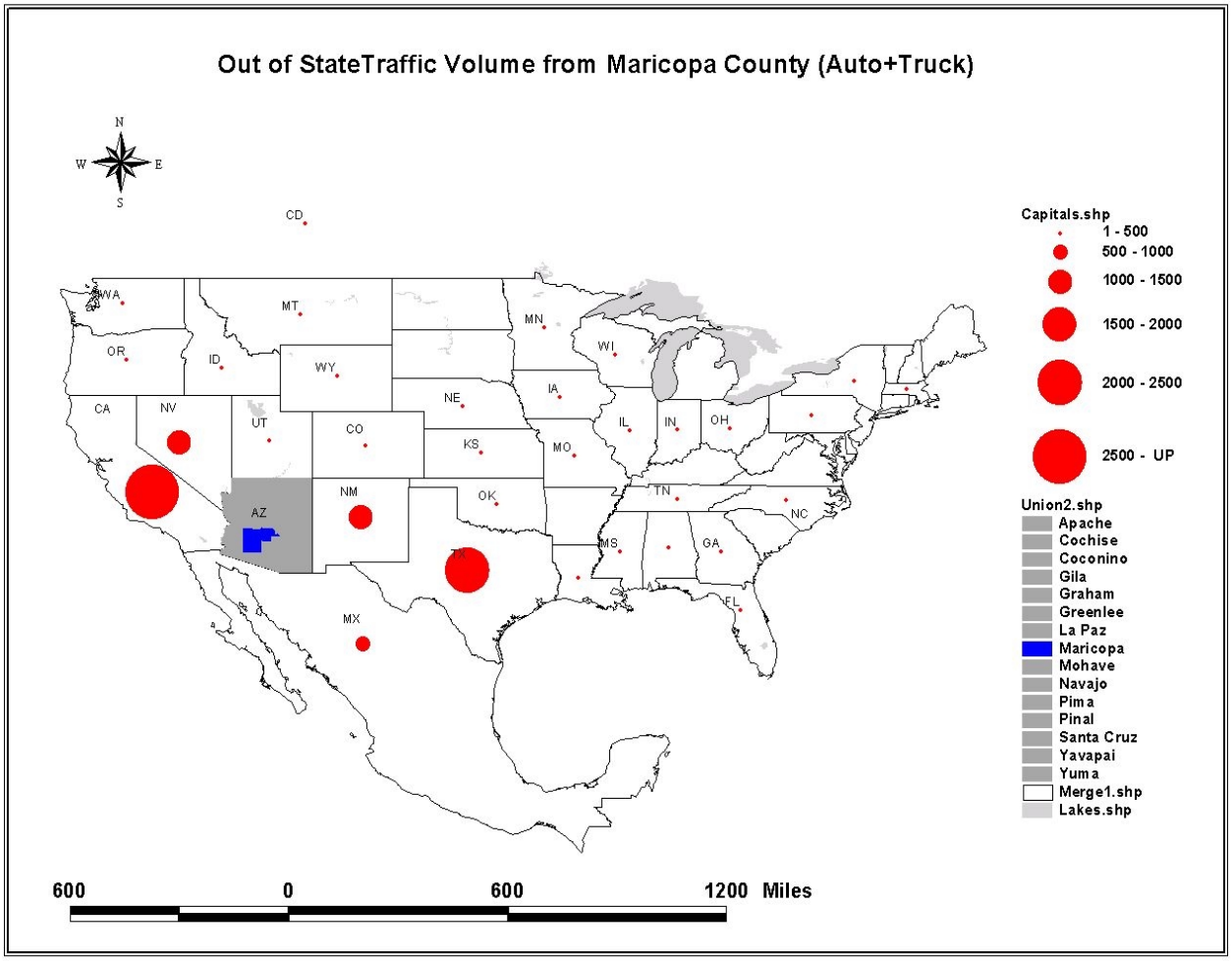


**Figure 26**
**Destinations of Internal-External and External-External Trips**
**US, Mexico, and Canada**




Figures 27 and 28 further show the major flows of external-external trips through the MAG region. The major flows for auto are between I-10 on the west and I-10 on the south and between I-17 on the north and I-10 on the south. For trucks, the primary flow is between I-10 on the west and I-10 on the south, with secondary flows between US-93 on the north and I-10 on the south and between I-17 on the north and I-10 on the south

**Figure 27**
**External-External Auto Trips**

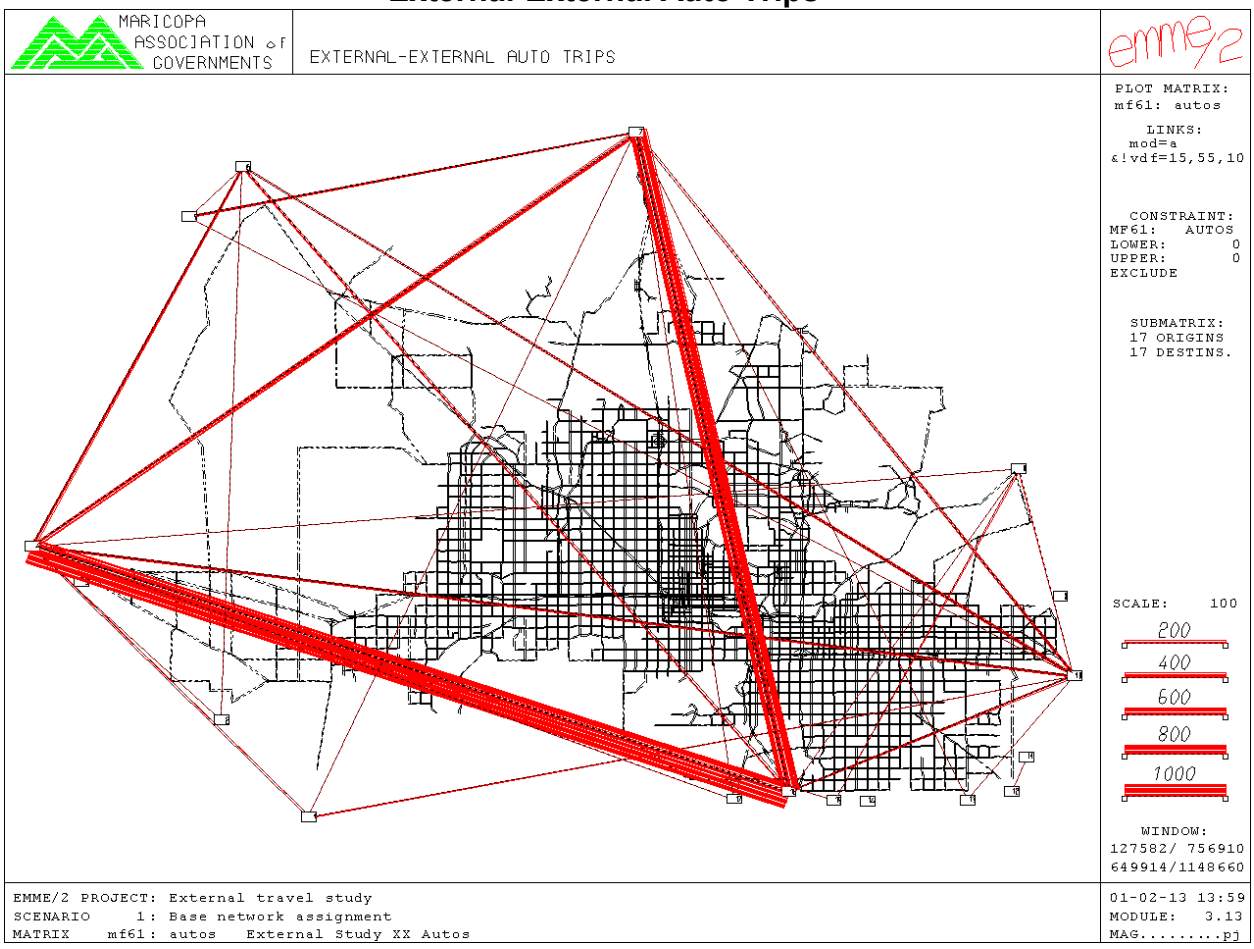
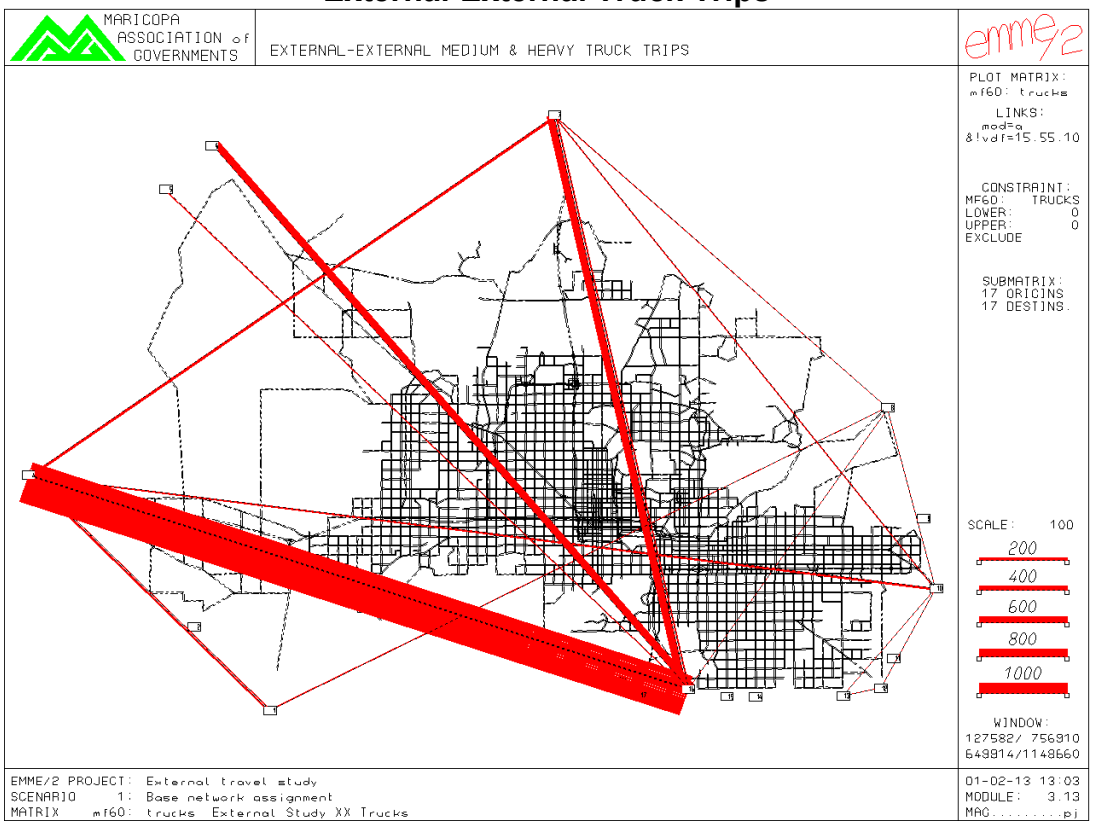


**Figure 28**
**External-External Truck Trips**




Figures 29 through 32 show the percents of trips by time of day and direction for each station for autos, heavy trucks, medium trucks, and total vehicles, while Figures 33 through 36 show the same data except that stations have been aggregated to three different types:

- Freeways (Stations 4, 7, and 16)
- Highways (Stations 1, 2, 5, 6, 8, 9, 10, 15, and 17)
- Other Roadways (Stations 3, 11, 12, 13, and 14)

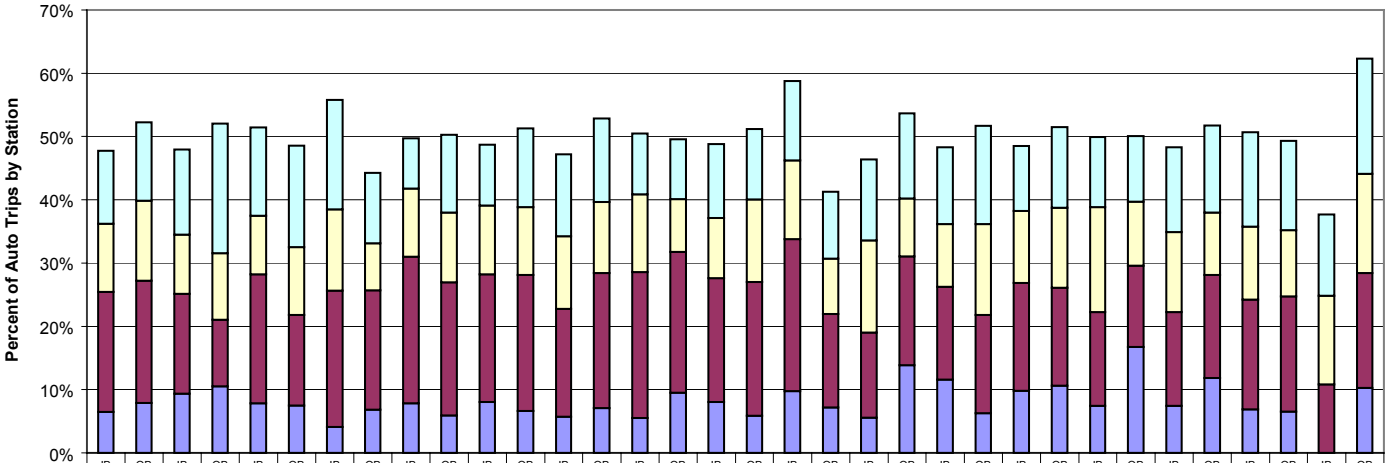
Times-of-day summarized in Figure 29 through 36 were defined as follows:

| Time Period | Definition |
|---|---|
| AM Peak | 6:00 AM – 8:59 AM |
| Midday | 9:00 AM – 2:59 PM |
| PM Peak | 3:00 PM – 5:59 PM |
| Night | 6:00 PM – 5:59 AM |

Figures 33 through 36 also show the summaries for all roadway types combined. Data shown in Appendix C were the source for the summaries shown in Figures 29 through 36.

Two bars are shown for each station or roadway type—one for the in-bound direction percents by time of day and one shows the outbound percents. The percentages for both bars sum to 100 percent (within ±1 percent due to rounding error), with most individual bars summing to approximately 50 percent. Pairs of bars for a station or roadway type that vary from 50 percent show a daily directional bias either to in-bound or out-bound travel (e.g., auto trips for Stations 4, 10, and 17). When stations are aggregated to the three roadway types, total in-bound and out-bound trips are very close to 50 percent for each direction.

## Figure 29
## Auto Trips by Time-of-Day and Direction by Station

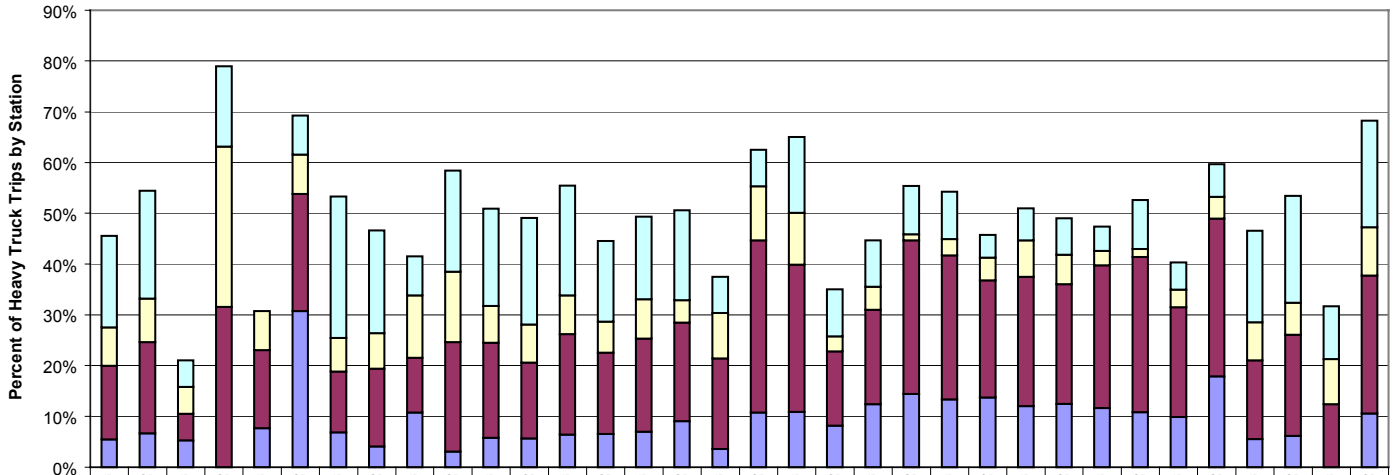



| | IB 1 | OB 1 | IB 2 | OB 2 | IB 3 | OB 3 | IB 4 | OB 4 | IB 5 | OB 5 | IB 6 | OB 6 | IB 7 | OB 7 | IB 8 | OB 8 | IB 9 | OB 9 | IB 10 | OB 10 | IB 11 | OB 11 | IB 12 | OB 12 | IB 13 | OB 13 | IB 14 | OB 14 | IB 15 | OB 15 | IB 16 | OB 16 | IB 17 | OB 17 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Night | 12% | 12% | 13% | 20% | 14% | 16% | 17% | 11% | 8% | 12% | 10% | 12% | 13% | 13% | 10% | 9% | 12% | 11% | 13% | 11% | 13% | 13% | 12% | 16% | 10% | 13% | 11% | 10% | 13% | 14% | 15% | 14% | 13% | 18% |
| PM | 11% | 13% | 9% | 11% | 9% | 11% | 13% | 7% | 11% | 11% | 11% | 11% | 11% | 11% | 12% | 8% | 9% | 13% | 12% | 9% | 15% | 9% | 10% | 14% | 11% | 13% | 17% | 10% | 13% | 10% | 12% | 10% | 14% | 16% |
| Midday | 19% | 19% | 16% | 11% | 20% | 14% | 22% | 19% | 23% | 21% | 20% | 21% | 17% | 21% | 23% | 22% | 20% | 21% | 24% | 15% | 13% | 17% | 15% | 16% | 17% | 16% | 15% | 13% | 15% | 16% | 17% | 18% | 11% | 18% |
| AM | 6% | 8% | 9% | 11% | 8% | 8% | 4% | 7% | 8% | 6% | 8% | 7% | 6% | 7% | 6% | 10% | 8% | 6% | 10% | 7% | 6% | 14% | 12% | 6% | 10% | 11% | 7% | 17% | 7% | 12% | 7% | 7% | 0% | 10% |

**Station Number and Direction**

Note: In-Bound (IB) and Out-Bound (OB) percentages sum to 100% for each station.

## Figure 30
## Heavy Truck Trips by Time-of-Day and Direction by Station

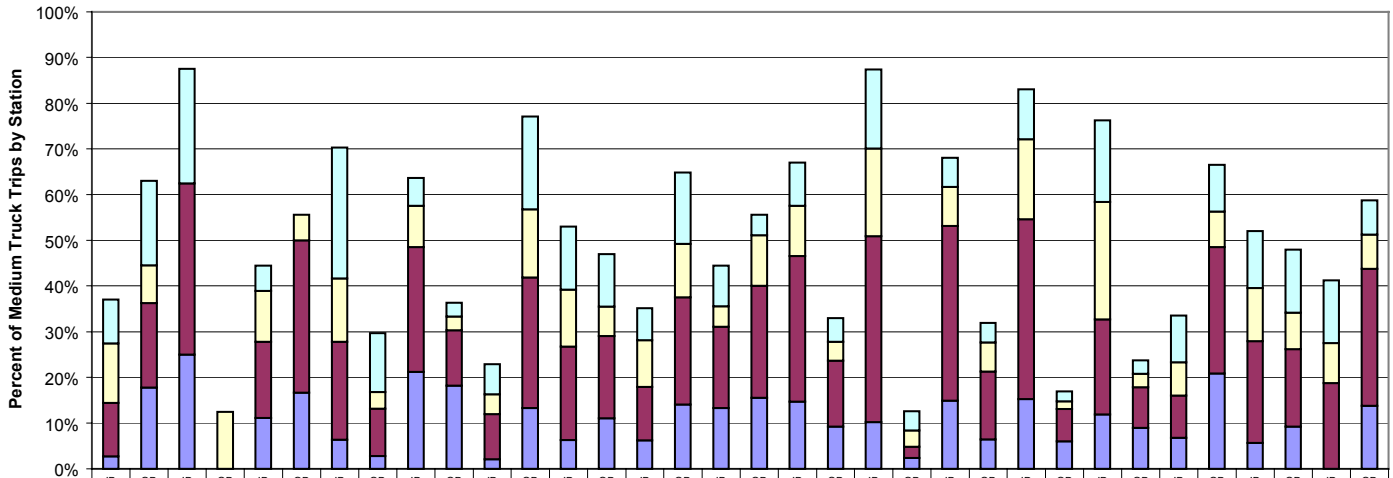



| | IB 1 | OB 1 | IB 2 | OB 2 | IB 3 | OB 3 | IB 4 | OB 4 | IB 5 | OB 5 | IB 6 | OB 6 | IB 7 | OB 7 | IB 8 | OB 8 | IB 9 | OB 9 | IB 10 | OB 10 | IB 11 | OB 11 | IB 12 | OB 12 | IB 13 | OB 13 | IB 14 | OB 14 | IB 15 | OB 15 | IB 16 | OB 16 | IB 17 | OB 17 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Night | 18% | 21% | 5% | 16% | 0% | 8% | 28% | 20% | 8% | 20% | 19% | 21% | 22% | 16% | 16% | 18% | 7% | 7% | 15% | 9% | 9% | 10% | 9% | 4% | 6% | 7% | 5% | 10% | 5% | 6% | 18% | 21% | 10% | 21% |
| PM | 8% | 9% | 5% | 32% | 8% | 8% | 7% | 7% | 12% | 14% | 7% | 7% | 8% | 6% | 8% | 4% | 9% | 11% | 10% | 3% | 5% | 1% | 3% | 4% | 7% | 6% | 3% | 2% | 3% | 4% | 7% | 6% | 9% | 10% |
| Midday | 15% | 18% | 5% | 32% | 15% | 23% | 12% | 15% | 11% | 22% | 19% | 15% | 20% | 16% | 18% | 19% | 18% | 34% | 29% | 15% | 19% | 30% | 28% | 23% | 25% | 24% | 28% | 31% | 22% | 31% | 16% | 20% | 12% | 27% |
| AM | 5% | 7% | 5% | 0% | 8% | 31% | 7% | 4% | 11% | 3% | 6% | 6% | 6% | 7% | 7% | 9% | 4% | 11% | 11% | 8% | 12% | 14% | 13% | 14% | 12% | 13% | 12% | 11% | 10% | 18% | 6% | 6% | 0% | 11% |

**Station Number and Direction**

Note: In-Bound (IB) and Out-Bound (OB) percentages sum to 100% for each station.

## Figure 31
## Medium Truck Trips by Time-of-Day and Direction by Station

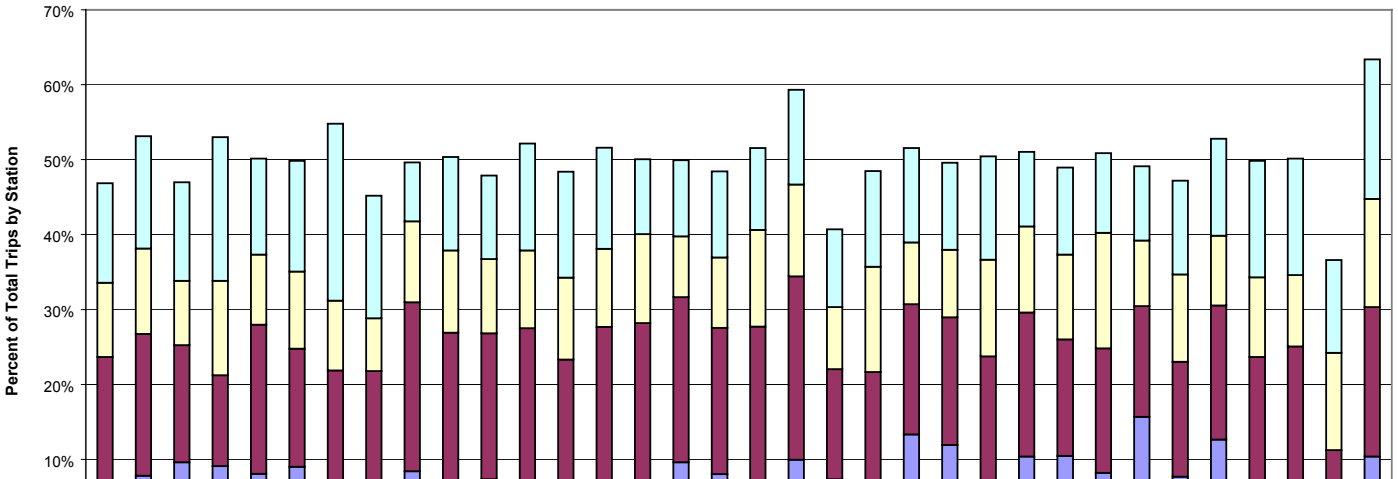



| | IB 1 | OB 1 | IB 2 | OB 2 | IB 3 | OB 3 | IB 4 | OB 4 | IB 5 | OB 5 | IB 6 | OB 6 | IB 7 | OB 7 | IB 8 | OB 8 | IB 9 | OB 9 | IB 10 | OB 10 | IB 11 | OB 11 | IB 12 | OB 12 | IB 13 | OB 13 | IB 14 | OB 14 | IB 15 | OB 15 | IB 16 | OB 16 | IB 17 | OB 17 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Night | 10% | 18% | 25% | 0% | 6% | 0% | 29% | 13% | 6% | 3% | 7% | 20% | 14% | 12% | 7% | 16% | 9% | 4% | 9% | 5% | 17% | 4% | 6% | 4% | 11% | 2% | 18% | 3% | 10% | 10% | 12% | 14% | 14% | 8% |
| PM | 13% | 8% | 0% | 13% | 11% | 6% | 14% | 4% | 9% | 3% | 4% | 15% | 12% | 6% | 10% | 12% | 4% | 11% | 11% | 4% | 19% | 4% | 9% | 6% | 17% | 2% | 26% | 3% | 7% | 8% | 12% | 8% | 9% | 8% |
| Midday | 12% | 18% | 38% | 0% | 17% | 33% | 21% | 10% | 27% | 12% | 10% | 29% | 20% | 18% | 12% | 23% | 18% | 24% | 32% | 14% | 41% | 2% | 38% | 15% | 39% | 7% | 21% | 9% | 9% | 28% | 22% | 17% | 19% | 30% |
| AM | 3% | 18% | 25% | 0% | 11% | 17% | 6% | 3% | 21% | 18% | 2% | 13% | 6% | 11% | 6% | 14% | 13% | 16% | 15% | 9% | 10% | 2% | 15% | 6% | 15% | 6% | 12% | 9% | 7% | 21% | 6% | 9% | 0% | 14% |

Station Number and Direction

Note: In-Bound (IB) and Out-Bound (OB) percentages sum to 100% for each station.

## Figure 32
## Total Trips by Time-of-Day and Direction by Station

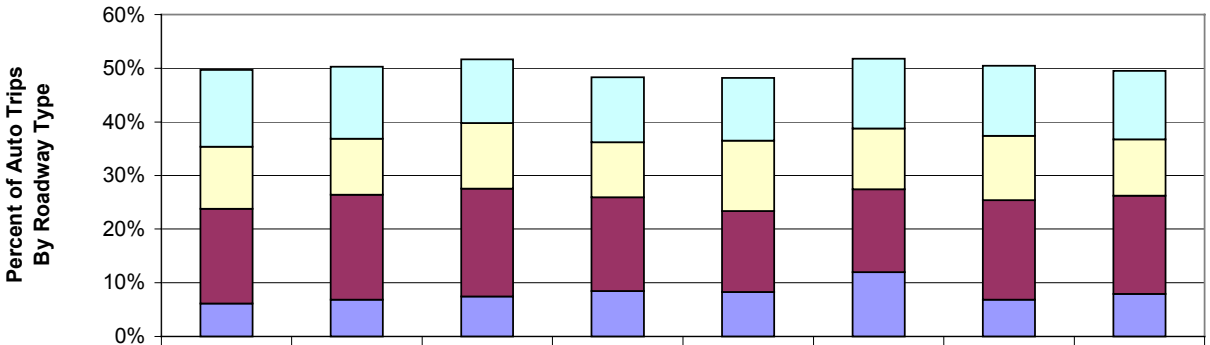



| | IB 1 | OB 1 | IB 2 | OB 2 | IB 3 | OB 3 | IB 4 | OB 4 | IB 5 | OB 5 | IB 6 | OB 6 | IB 7 | OB 7 | IB 8 | OB 8 | IB 9 | OB 9 | IB 10 | OB 10 | IB 11 | OB 11 | IB 12 | OB 12 | IB 13 | OB 13 | IB 14 | OB 14 | IB 15 | OB 15 | IB 16 | OB 16 | IB 17 | OB 17 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Night | 13% | 15% | 13% | 19% | 13% | 15% | 24% | 16% | 8% | 12% | 11% | 14% | 14% | 14% | 10% | 10% | 12% | 11% | 13% | 10% | 13% | 13% | 12% | 14% | 10% | 12% | 11% | 10% | 12% | 13% | 16% | 16% | 12% | 19% |
| PM | 10% | 11% | 9% | 13% | 9% | 10% | 9% | 7% | 11% | 11% | 10% | 10% | 11% | 10% | 12% | 8% | 9% | 13% | 12% | 8% | 14% | 8% | 9% | 13% | 11% | 11% | 15% | 9% | 12% | 9% | 11% | 9% | 13% | 14% |
| Midday | 18% | 19% | 16% | 12% | 20% | 16% | 16% | 17% | 23% | 21% | 19% | 21% | 18% | 21% | 23% | 22% | 20% | 21% | 25% | 15% | 15% | 17% | 17% | 17% | 19% | 16% | 17% | 15% | 15% | 18% | 17% | 19% | 11% | 20% |
| AM | 6% | 8% | 10% | 9% | 8% | 9% | 6% | 5% | 8% | 6% | 7% | 7% | 6% | 7% | 6% | 10% | 8% | 6% | 10% | 7% | 6% | 13% | 12% | 7% | 10% | 10% | 8% | 16% | 8% | 13% | 7% | 7% | 0% | 10% |

Station Number and Direction

Note: In-Bound (IB) and Out-Bound (OB) percentages sum to 100% for each station.

## Figure 33
## Auto Trips by Time-of-Day and Direction by Type of Roadway

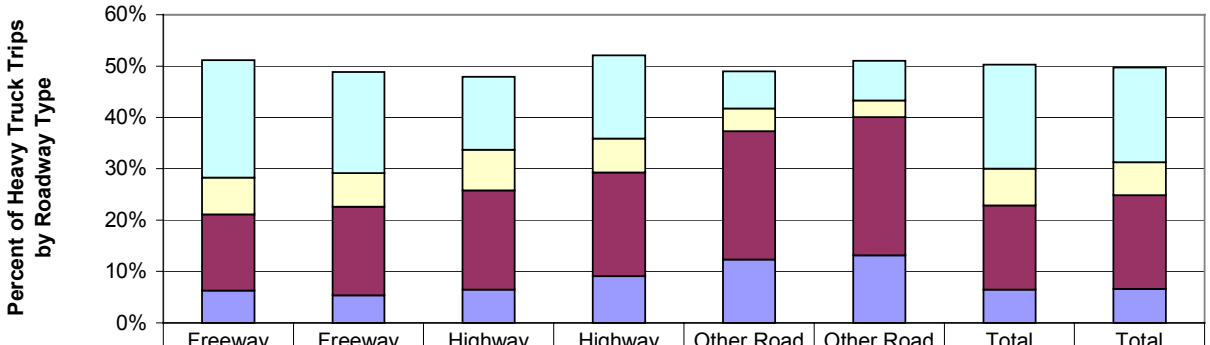



| | Freeway In-Bound | Freeway Out-Bound | Highway In-Bound | Highway Out-Bound | Other Road In-Bound | Other Road Out-Bound | Total In-Bound | Total Out-Bound |
|---|---|---|---|---|---|---|---|---|
| Night | 14% | 13% | 12% | 12% | 12% | 13% | 13% | 13% |
| PM | 12% | 10% | 12% | 10% | 13% | 11% | 12% | 10% |
| Midday | 18% | 20% | 20% | 17% | 15% | 15% | 19% | 18% |
| AM | 6% | 7% | 7% | 8% | 8% | 12% | 7% | 8% |

**Roadway Type**

Note: In-Bound and Out-Bound percentages sum to 100% for each roadway type.

## Figure 34
## Heavy Truck Trips by Time-of-Day and Direction by Type of Roadway

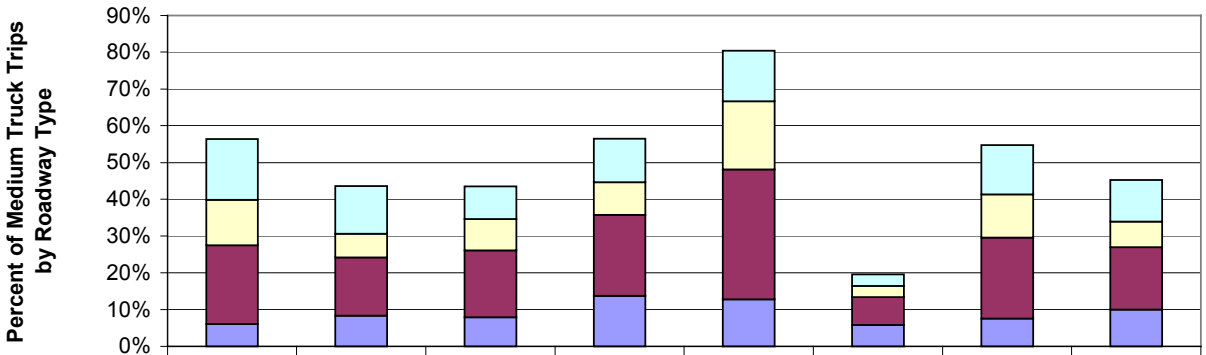



| | Freeway In-Bound | Freeway Out-Bound | Highway In-Bound | Highway Out-Bound | Other Road In-Bound | Other Road Out-Bound | Total In-Bound | Total Out-Bound |
|---|---|---|---|---|---|---|---|---|
| Night | 23% | 20% | 14% | 16% | 7% | 8% | 20% | 18% |
| PM | 7% | 7% | 8% | 7% | 4% | 3% | 7% | 6% |
| Midday | 15% | 17% | 19% | 20% | 25% | 27% | 16% | 18% |
| AM | 6% | 5% | 6% | 9% | 12% | 13% | 7% | 7% |

**Roadway Type**

Note: In-Bound and Out-Bound percentages sum to 100% for each roadway type.

## Figure 35
## Medium Truck Trips by Time-of-Day and Direction by Type of Roadway

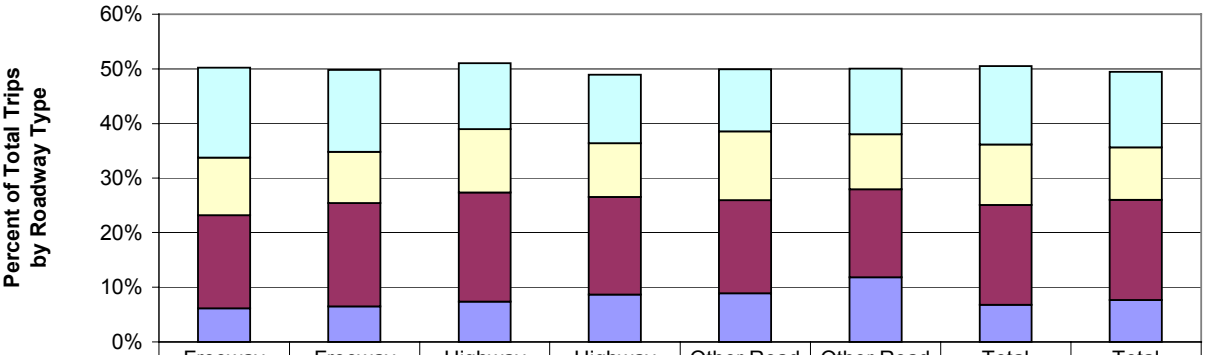



| | Freeway In-Bound | Freeway Out-Bound | Highway In-Bound | Highway Out-Bound | Other Road In-Bound | Other Road Out-Bound | Total In-Bound | Total Out-Bound |
|---|---|---|---|---|---|---|---|---|
| Night | 17% | 13% | 9% | 12% | 14% | 3% | 13% | 11% |
| PM | 12% | 7% | 8% | 9% | 19% | 3% | 12% | 7% |
| Midday | 21% | 16% | 18% | 22% | 35% | 8% | 22% | 17% |
| AM | 6% | 8% | 8% | 14% | 13% | 6% | 8% | 10% |

**Roadway Type**

Note: In-Bound and Out-Bound percentages sum to 100% for each roadway type.

## Figure 36
## Total Trips by Time-of-Day and Direction by Type of Roadway




| | Freeway In-Bound | Freeway Out-Bound | Highway In-Bound | Highway Out-Bound | Other Road In-Bound | Other Road Out-Bound | Total In-Bound | Total Out-Bound |
|---|---|---|---|---|---|---|---|---|
| Night | 17% | 15% | 12% | 13% | 11% | 12% | 14% | 14% |
| PM | 11% | 9% | 12% | 10% | 13% | 10% | 11% | 10% |
| Midday | 17% | 19% | 20% | 18% | 17% | 16% | 18% | 18% |
| AM | 6% | 7% | 7% | 9% | 9% | 12% | 7% | 8% |

**Roadway Type**

Note: In-Bound and Out-Bound percentages sum to 100% for each roadway type.

# Appendix A – Sample Selection Memorandum

# PHOENIX EXTERNAL TRAVEL SURVEY

## TECHNICAL MEMORANDUM
## TASK 2
## EXTERNAL SURVEY SAMPLE DESIGN

(Final Draft)

Prepared for

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August 19, 1999

## Introduction

The Maricopa Association of Governments (MAG) is undertaking the External Travel Survey as part of its responsibility for maintaining the regional travel demand forecasting model for the Phoenix metropolitan area. This vital tool is used for regional transportation planning and for supplying design volume forecasts for most major transportation projects undertaken by the Arizona Department of Transportation (ADOT), Maricopa County, and municipalities within the region.

MAG is continuously involved in efforts to update the regional travel model. The external travel model component of the model estimates travel through the region (external-external, or through, travel) and travel into and out-of the region (internal-external travel). The area included in the regional travel model has increased significantly since the last update to the external travel model components in 1986. Thus, in addition to changes in external travel that may have occurred over time, there are changes in external travel due to the changing modeling area that must be properly reflected in the regional travel model. The results of the 1999 External Travel Survey are necessary to the continued production of high quality travel forecasts for the region.

The external survey will be a traditional intercept survey where information on the current trip being made will be asked. A sample of vehicles leaving the region will be surveyed at the external survey sites. Fifteen sites will be surveyed including each of the major highways that leave the region.

The purposes of this technical memorandum are as follows:

- define the external station sites to be surveyed,
- define desired sample sizes and associated accuracy levels,
- define the procedures used to collect the external survey data,
- define the question list to be used for the roadside interview.

## Proposed Survey Locations

Roadside interviews will be conducted at 15 external stations along the perimeter of the MAG study area. These locations include three interstate highways, three US highways, four state highways, and five county roads. Traffic counts only will be taken at two additional sites. The external stations to be surveyed and counted are shown in Figure 1; Table 1 lists the sites along with traffic counts and typical peak hour, peak direction volumes.

# Figure 1
# MAG External Station Sites

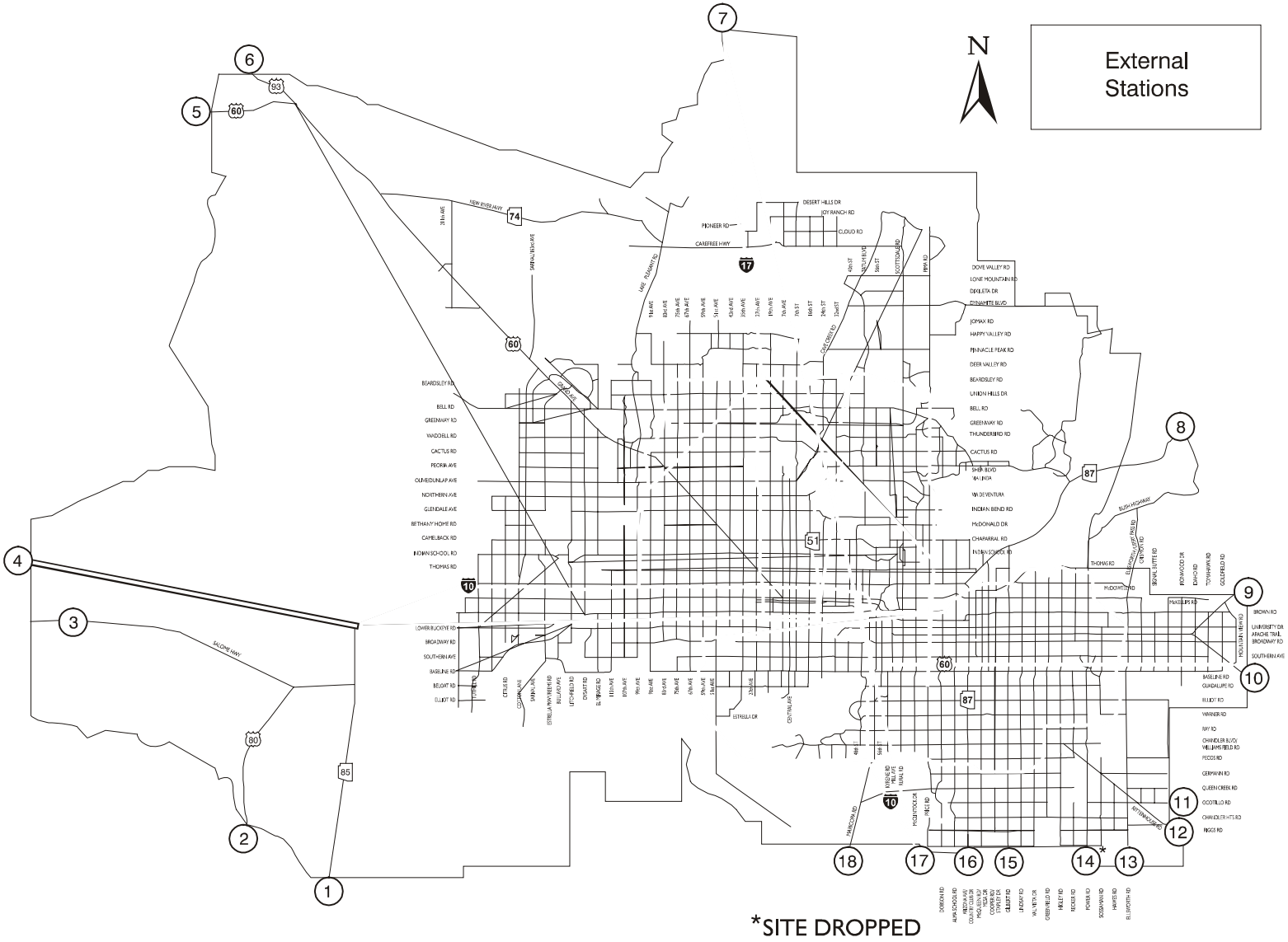


**Table 1**
**Survey Sites and Traffic Volumes**

| Site Number | General Location | 2-way Average Daily Traffic | Typical Peak-Hour, Peak-Direction Volume[1] |
|---|---|---|---|
| 1 | SR-85 at Patterson Road | 9,000 | 430 |
| 2 | Old US 80 at Gila River | 1,000 | 50 |
| 3 | Salome Highway east of Courthouse Road | 1,000 | 50 |
| 4 | I-10 at 477th Avenue | 15,000 | 720 |
| 5 | US 60 at 355th Avenue | 2,000 | 100 |
| 6 | US 93 at Maricopa/Yavapai County Boundary | 6,000 | 290 |
| 7 | I-17 at Maricopa/Yavapai County Boundary | 30,000 | 1,440 |
| 8 | SR 87/Beeline Highway east of Bush Highway | 7,000 | 340 |
| 9[2] | SR 88 south of First Water Road | 5,000 | 240 |
| 10 | US 60 about 3 miles southeast of Goldfield Road | 16,000 | 770 |
| 11 | Ocotillo Road east of Meridian Road | 2,000 | 100 |
| 12 | Rittenhouse Road south of Hunt Highway | 3,000 | 140 |
| 13 | Hunt Highway 1.7 miles east of Ellsworth Road | 3,000 | 140 |
| 14 | Power Road 1.5 miles south of Hunt Highway | Site Dropped[3] | |
| 15[2] | Gilbert Road south of Hunt Highway | 1,000 | 50 |
| 16 | SR 87 at SR87/SR587 Junction | 8,000 | 390 |
| 17 | I-10 south of Hunt Highway | 37,000 | 1,780 |
| 18 | SR 347/Maricopa Road south of Hunt Highway | 9,000 | 430 |

[1] Based on traffic counts performed for an external station survey in Colorado, the peak hour factor is approximately 8 percent and the peak direction split factor is 60 percent.

[2] Traffic counts only will be taken at these sites.

[3] Based on an initial review of the sites, it was discovered that one site originally slated for the external survey, Power Road, 1.5 miles south of Hunt Highway, did not actually exist. Power Road "t's" into Hunt Highway and does not extend to the south. For this reason, the road was dropped from the survey list.

## Survey Statistics

### Sample Size

It is not necessary to obtain interviews from the drivers of all vehicles in the traffic stream in order to draw statistical inferences about the travelers and vehicles in the traffic stream. A sample can be selected and the information obtained from the sampled vehicles used instead of collecting data from all vehicles. The sample rate depends on the sampling error which can be tolerated. There are two aspects to sampling error: the precision of the estimate and the confidence that one has regarding that precision. Given a proportion *p* from the sample, it is necessary to know how well the sample estimate of *p* represents the proportion that would have been obtained had all drivers been interviewed. Precision is measured by the standard error of the estimate of the proportion, $\sigma_p$. If *p*, the proportion, is equal to 0.5 and $\sigma_p$ is equal to 0.05, the error is said to be plus or minus 0.05.

The standard error of a proportion can be calculated. For example, it can be assumed that the proportion of drivers who live inside the study area needs to be known, and that from the sample, 50 percent are residents. The standard error of the estimate of *p* is calculated as:

$$\sigma_p = \sqrt{\frac{pq}{n}}$$

where: $\sigma_p$ = standard error of the proportion p
*p* = proportion of sampled items having a specific attribute
*q* = 1 - *p*
*n* = number of elements sampled

Equation (1) can be rearranged to estimate the sample size required to obtain a desired standard error. Solving for *n* yields:

$$n = \frac{pq}{\sigma_p^2}$$

The above equation is actually for a sample drawn from an infinite universe. When the number of elements in the universe is finite, a finite correction factor is required to estimate the sample standard error:

$$\sigma_p = \sqrt{\frac{pq}{n} \times \frac{m-n}{m-1}}$$

where: *m* = number of elements in the universe.

The term:

$$\sqrt{\frac{m-n}{m-1}}$$

represents the finite correction factor.

Solving for *n* yields:

$$n = \frac{pqm}{\sigma_p^2 (m-1) + pq}$$

In the case of an external survey, *m* can represent daily traffic volume at a particular survey site. The use of the finite correction factor can be illustrated by determining the required sample size without finite correction and with finite correction for an daily volume (*m*) of 50 vehicles, a proportion (*p*) of 0.5, and a desired standard error ($\sigma_p$) of 0.05. Using equation (2) the required sample size is:

$$n = \frac{(0.5)(0.5)}{(0.05)^2}$$

$$\text{phantomn} = 100$$

But, since *m* = 50, it is impossible to have *n* = 100. With the finite correction factor the required sample size is (using equation 4):

$$n = \frac{(0.5)(0.5)(50)}{((0.05)^2 (50-1)) + ((0.5)(0.5))}$$

$$= 34$$

The other aspect of sampling error is the confidence level. For one standard error of the estimate the confidence level is about 68 percent. This means that if 100 independent samples of a population were taken, the sample proportion would be bounded by one standard error for 68 of the samples. In the case of the example above, this would mean that 68 times out of 100, the sampled proportion would be bounded by the range of 0.5 ± 0.05, or in the range 0.45 to 0.55. If greater confidence is desired, for example, about 95 percent, the range could be specified to be about two standard errors (actually, the value is 1.96 standard errors). In the example this would yield a range of about 0.4 to 0.6 if the sample proportion were 0.5.

The acceptable error for a specified confidence level can be specified as:

$$E = Z\sigma_p$$

Where: Z is the number of standard deviations required for a specified confidence level.

Solving equation (5) for $\sigma_p$ and substituting in equation (2) results in the following:

$$n = \frac{(Z^2)\,pq}{E^2}$$

Equation (4) becomes:

$$n = \frac{Z^2\ pqm}{(E^2\ (m-1) + Z^2\ pq)}$$

If it is assumed that *E* is 0.05, or ±10 percent of the 0.5 proportion, and *Z* is 2 for the 95 percent confidence interval, then equation (7) can be reduced to:

$$n = \frac{400\,m}{(m + 399)}$$

Assuming *Z* is 2, rather than 1.96, will increase the confidence interval and slightly overestimate the required sample size.

In the example described above using the finite correction factor and assuming that a 95 percent confidence level is desired, the required number of samples can be estimated using equation (8):

$$n = \frac{(400\ \_\ 50)}{(50 + 399)}$$

$$= 45$$

Thus, when the confidence level is increased from 68 percent to 95 percent, the required number of samples increases about 33 percent, from 34 to 45, if the universe of trips is 50. Note that for an infinite universe, the same increase in the confidence interval would quadruple the sample size (from 100 to 400).

In equations (6) and (7), the required number of samples for a specified error level is greatest when the term *pq* is at a maximum. This occurs when $p = 0.5$. Thus, the maximum number of samples required to estimate the proportion p with a sampling error of E or less at a specified level of confidence can be estimated by assuming a proportion, *p*, of 0.5.

Initial sample sizes for each external station site have been determined. They are based on currently available traffic count data and the methodology described above. An additional 15 percent “correction factor” has been included to account for loss of surveys due to data errors. This is important since it will not be possible to recontact respondents to clarify responses.

Table 2 shows the external survey locations, average daily two-way traffic count, average daily one-way traffic count, the required and recommended sample sizes, and the percent of the one-way (outbound) traffic that will be surveyed.

**Table 2**
**Survey Sites and Sample Sizes**

| Site Number | General Location | 2-way Average Daily Traffic | 1-way Average Daily Traffic | Required Sample Size | Target Sample Size | Percent of 1-way ADT |
|---|---|---|---|---|---|---|
| 1 | SR-85 at Patterson Road | 9,000 | 4,500 | 383 | 440 | 10% |
| 2 | Old US 80 at Gila River | 1,000 | 500 | 286 | 330 | 66% |
| 3 | Salome Highway east of Courthouse Road | 1,000 | 500 | 286 | 330 | 66% |
| 4[1] | I-10 at 477th Avenue | 15,000 | 7,500 | 390 | 900 | 12% |
| 5 | US 60 at 355th Avenue | 2,000 | 1,000 | 333 | 380 | 38% |
| 6 | US 93 at Maricopa/Yavapai County Boundary | 6,000 | 3,000 | 375 | 430 | 14% |
| 7[1] | I-17 at Maricopa/Yavapai County Boundary | 30,000 | 15,000 | 395 | 910 | 6% |
| 8 | SR 87/Beeline Highway east of Bush Highway | 7,000 | 3,500 | 378 | 430 | 12% |
| 9 | SR 88 south of First Water Road | 5,000 | 2,500 | No Surveys - Counts Only | | |
| 10[1] | US 60 about 3 miles southeast of Goldfield Road | 16,000 | 8,000 | 390 | 900 | 11% |
| 11 | Ocotillo Road east of Meridian Road | 2,000 | 1,000 | 333 | 380 | 38% |
| 12 | Rittenhouse Road south of Hunt Highway | 3,000 | 1,500 | 353 | 410 | 27% |
| 13 | Hunt Highway 1.7 miles east of Ellsworth Road | 3,000 | 1,500 | 353 | 410 | 27% |
| 14 | Power Road 1.5 miles south of Hunt Highway | Site Dropped | | | | |
| 15 | Gilbert Road south of Hunt Highway | 1,000 | 500 | No Surveys - Counts Only | | |
| 16 | SR 87 at SR87/SR587 Junction | 8,000 | 4,000 | 381 | 440 | 11% |
| 17[1] | I-10 south of Hunt Highway | 37,000 | 18,500 | 396 | 910 | 5% |
| 18 | SR 347/Maricopa Road south of Hunt Highway | 9,000 | 4,500 | 383 | 440 | 10% |

[1] Sample size doubled.

While not required for statistical purposes, the sample sizes at the four external stations with volumes in excess of 15,000 vehicles per day (i.e., I-10 at 477th Avenue, I-17 at the Maricopa/Yavapai County Line, US60 southwest of Goldfield Road, and I-10 South of Hunt Highway) will be doubled. This will provide additional accuracy by time of day for these four important external stations.

It should be emphasized that sample sizes for each external station determined from the methodology described above are based on limiting the sampling error associated with estimating the proportions of trips. These proportions can be of any type, such as the proportion of trips at the external station that are internal-external or external-external, or the proportion of trips at the external station that originated at a specific external station. The sample sizes are not based on limiting the sample error associated with determining, for example, the average trip length of internal-external trips. The sample error associated with that statistic will depend on the variation in the average trip length and the number of samples taken. Unfortunately, the variation for statistics such as average trip length will not be known until the data are collected. However, it is likely that the accuracy of many of the items required for model calibration (e.g., average trip length) will be dependent on samples from the full survey, not from each individual site. Thus, the sample size for many of the items important for modeling will be quite large.

**Sample Selection**

Several random sample selection techniques are available. First, starting with a random vehicle, every *nth* vehicle can be selected for the sample. This procedure will draw samples proportionally to the volumes throughout the day—more samples should be expected in higher volume peak periods than in off-peak periods. This procedure will work well on lower volume roads especially when there is only one lane of traffic in the direction being surveyed.
The fixed rate selection technique will be most appropriate for lower volume roads since flaggers will need to keep a count of passing vehicles (at least up to the sample interval). In the event that traffic volumes increase sufficiently to overload the surveyors, two options are available. First, an additional surveyor (such as the site supervisor) can be assigned for short periods to dissipate any queues in the survey area. Alternatively, the flagger can suspend pulling vehicles for the sample until the surveyors "catch up." When the surveyors indicate that they can accept additional samples, the flagger would then select a vehicle and again start pulling every *nth* vehicle for the survey.

An alternative to the fixed rate selection technique will be to sample a fixed number of vehicles per hour. The hourly rate will be determined by dividing the total number of required samples by the number of hours during which surveying will be performed. If, for example, an average of 40 vehicles per hour are required and three surveyors are assigned, the flagger can pull vehicles in platoons of three every five minutes. The random selection plan would be time-based in this case. This process will result in an over-sampling of off-peak period traffic and an under-sampling of peak period traffic. Time-of-day specific expansion factors can be used to correct for these biases.

Since it is desirable to cause as little delay as possible to surveyed motorists, a slight modification to this technique is usually implemented. Specifically, when a platoon of vehicles are pulled, drivers from all selected vehicles are interviewed and the platoon is released prior to pulling the next platoon. This technique has an added safety benefit since it reduces vehicle conflict between vehicles entering and leaving the survey site.

This modified platoon technique will be used for all interstate roadway external stations. It will also be used for any other roadway where the traffic control plan calls for multiple lanes to be open through the survey site. Note that when multiple lanes are open, vehicles will be sampled from only the right-most lane.

## Survey Procedures

### Survey Team

Typically, a survey site will be staffed by a crew of at least five people:

- *Site supervisor* The site supervisor will have direct responsibility and control over each survey site. The site supervisor will be responsible for ensuring that the site has been properly set up according to the traffic control plan, safety rules are followed by survey personnel, survey personnel have the necessary equipment, and the specified sample rate is maintained. In addition, the site supervisor will provide relief to survey personnel and perform initial quality control for the survey. Finally, the site supervisor will act as or delegate responsibility to someone to be the sample control manager (the person responsible for ensuring that sufficient samples are selected).

- *Flagger* The flagger will be responsible for directing selected vehicles to the survey site and directing non-surveyed vehicles past the site, when appropriate.

- *Interviewers* At least two interviewers will be required for each survey site. The interviewers will be responsible for administering the survey instrument and making an initial review and edit of the data they collect.

- *Off-duty law enforcement officer* At least one off-duty law enforcement officer will be used for each site providing the Arizona Department of Public Safety (DPS) will allow the off-duty officers to be on site. For interstate highway sites, two officers might be used. For the three interstate highways, four US highway, and five state highways, Arizona DPS personnel will be used; for the six county roads, county sheriffs will be used.

The flagger and interviewer positions will be filled by temporary personnel. The temporary personnel will be rotated through the positions in order to reduce boredom and fatigue. The site supervisor position will be filled by professional staff from the consultant team.

Representatives from MAG, ADOT, and the consultant will comprise an External Survey Management Team. This team will periodically inspect survey sites to ensure that survey procedures are being followed. In addition, each evening of the survey, the team will determine if the next day's survey needs to be postponed due to a forecast of inclement weather. If a survey is postponed, ADOT and DPS regional offices will be informed.

### Survey Period

Each external survey site will be surveyed for one day. For all sites, surveys will be conducted Tuesdays through Thursdays from one-half hour after sunrise to one-half hour before sunset. Depending on the date of the survey, between 10.5 and 11.5 hours of actual survey time will be available. Depending upon agreements with the firm supplying

surveyors, one or two survey crews will be used for each site. If two survey crews are used for a survey site, they will split the survey day into equal halves.

No surveys will be performed on “special event days” in the Phoenix region. Special event days will be defined as those days where substantial numbers of people might be expected to enter or leave the survey area for special events such as professional sporting events. For example the Phoenix Cardinals or the Coyotes might be expected to draw fans from outside the region. Thus, surveying on a game day might skew results, either from actual surveys or from traffic counts.

One or two external stations sites (in close proximity to each other) will be surveyed each travel day. Cellular telephones will be used to maintain communications with the survey sites.

**Interviewing Process**

The interviewing process will be the same for all sampling sites. Once a vehicle enters the survey area, the interviewer will record the time of the interview and the number of persons in the vehicle including infants (if the surveyor cannot determine the number of people in the car due to darkly tinted windows or for a panel van or recreational vehicle, he or she will ask the driver about the number of persons in the vehicle as part of the survey). The interviewer will then explain the survey, ask the driver of the vehicle to participate, and, if the driver agrees, administer the survey questions. The surveyor will complete all survey questions based on the driver's responses. Thus, the design of the survey form is not as crucial as the design of a self-administered survey form.

Both inbound and outbound traffic counts (in 15-minute increments) will be taken at the site location for 48 consecutive hours surrounding the selected survey days. Automated traffic counters that provide vehicle classification will be used. Three-hour, manual classification counts will be performed at two sites as a verification of the mechanical classification counts.

**Quality Control**

An external survey training and procedures manual will be developed to assist in training the survey staff. The survey manual will provide guidance and requirements on safety, appearance, duties and responsibilities, equipment, questions, and quality control. Interviewers will attend a brief training class presenting the tasks they are to perform, the survey forms that they will use, schedules, site locations, traffic control plans, and safety procedures. All field staff will be provided with and be required to wear safety vests and hard hats.

Quality control is an integral part the survey plan. The quality control measures for the external surveys is the primary responsibility of the site supervisor. The site supervisor will closely watch the interview process to ensure that proper questioning techniques are used and that forms are being properly completed within a reasonable established time of two minutes. Site supervisors will frequently monitor the interviewers' forms for accuracy, legibility, completeness, and proper attitude of the interviewers.

Several other steps will be taken to improve data quality. One or two days after the survey, each survey will receive an in-office review by an editor for consistency, completeness and clarity. Spelling will be corrected. When in-house editing is complete, the survey forms will

be transmitted to MAG for data entry and geocoding. Once these tasks are complete, data files will be processed using a program specifically written to perform survey checking.

**Survey Sequence**

One site or two adjacent external survey sites will be surveyed in one day. The sequence of survey sites will generally progress from those with lower traffic volumes to those with higher volumes. This will allow survey teams to progress from easier to more difficult survey sites, and will provide for good quality control. The survey sequence is shown in Table 3. The table provides the anticipated survey date along with the start and end times of the survey. The start and end times are based on sunrise and sunset times for Phoenix as published by the US Weather Service.

**Site Requirements**

Table 4 summarized staff requirements for each site. Staff site requirements are based on the assumption that each surveyor can complete 12 surveys per hour. Tables 5a-5o summarize the anticipated traffic volume and surveys on an hour-by-hour basis for each site. These tables provide the information required to estimate surveyor work loads.

**Survey Questions**

The survey questionnaire is designed to obtain key information for travel model development while recognizing the need for a short (one to two minute) interview. Different surveys will be administered for personal use vehicles (autos, pick-ups, vans, etc.) and commercial vehicles (large trucks).

The proposed personal use vehicle survey questionnaires will solicit the following information:

<u>Survey Control Data:</u>

The purpose of the survey control data form is to provide basic information about each survey for survey tracking and quality control.

1. Questionnaire number (pre-printed)
2. Station Number
3. Station Location
4. Location
5. Day of Week
6. Date
7. Interviewer(s)

**Table 3**
**Initial Sequence of External Survey Sites**

| Date | Site Number | General Description | Sunrise / Sunset | Survey Start / End Times | Survey Duration |
|---|---|---|---|---|---|
| 9/14 | 2 | Old US 80 at Gila River | 6:11am-6:36pm | 6:45am-6:00pm | 11:15 |
| 9/15 | 3 | Salome Highway east of Courthouse Road | 6:12am-6:35pm | 6:45am-6:00pm | 11:15 |
| 9/16 | 5 | US 60 at 355th Avenue | 6:12am-6:34pm | 6:45am-6:00pm | 11:15 |
| 9/21 | 12 | Rittenhouse Road south of Hunt Highway | 6:16am-6:27pm | 6:45am-6:00pm | 11:15 |
| 9/21 | 13 | Hunt Highway 1.7 miles east of Ellsworth Road | 6:16am-6:27pm | 6:45am-6:00pm | 11:15 |
| *9/21* | *9* | *SR 88 south of First Water Road* | | *Counts Only* | |
| 9/22 | 16 | SR 87 at SR87/SR587 Junction | 6:16am-6:25pm | 6:45am-6:00pm | 11:15 |
| 9/22 | 11 | Ocotillo Road east of Meridian Road | 6:16am-6:25pm | 6:45am-6:00pm | 11:15 |
| 9/23 | 6 | US 93 at Maricopa/Yavapai County Boundary | 6:17am-6:24pm | 6:45am-5:50pm | 11:05 |
| *9/23* | *15* | *Gilbert Road south of Hunt Highway* | | *Counts Only* | |
| 9/28 | 8 | SR 87/Beeline Highway east of Bush Highway | 6:20am-6:17pm | 6:50am-5:45pm | 10:55 |
| 9/29 | 18 | SR 347/Maricopa Road south of Hunt Highway | 6:21am-6:16pm | 6:50am-5:45pm | 10:55 |
| 9/30 | 1 | SR-85 at Patterson Road | 6:22am-6:14pm | 6:50am-5:45pm | 10:55 |
| 10/5 | 4 | I-10 at 477th Avenue | 6:25am-6:08pm | 7:00am-5:40pm | 10:40 |
| 10/6 | 10 | US 60 about 3 miles southeast of Goldfield Road | 6:26am-6:06pm | 7:00am-5:35pm | 10:35 |
| 10/7 | 7 | I-17 at Maricopa/Yavapai County Boundary | 6:27am-6:05pm | 7:00am-5:35pm | 10:35 |
| 10/12 | 17 | I-10 south of Hunt Highway | 6:30am-5:59pm | 7:00am-5:30pm | 10:30 |
| | *14* | *Power Road 1.5 miles south of Hunt Highway* | | *Site Dropped* | |

**Table 4**
**Site Staff Requirements**

| Site Number | General Location | Number of Surveys | Target Surveys /hour | Surveyors Required | Flaggers | Relief | Total |
|---|---|---|---|---|---|---|---|
| 1 | SR-85 at Patterson Road | 440 | 40 | 3 | 1 | 1 | 5 |
| 2 | Old US 80 at Gila River | 330 | 29 | 2 | 1 | 1 | 4 |
| 3 | Salome Highway east of Courthouse Road | 330 | 29 | 2 | 1 | 1 | 4 |
| 4 | I-10 at 477th Avenue | 900 | 84 | 7 | 2 | 0 | 9 |
| 5 | US 60 at 355th Avenue | 380 | 33 | 3 | 1 | 0 | 4 |
| 6 | US 93 at Maricopa/Yavapai County Boundary | 430 | 38 | 3 | 1 | 1 | 5 |
| 7 | I-17 at Maricopa/Yavapai County Boundary | 910 | 86 | 7 | 2 | 1 | 10 |
| 8 | SR 87/Beeline Highway east of Bush Highway | 430 | 39 | 3 | 1 | 1 | 5 |
| 9 | SR 88 south of First Water Road | | | Counts Only | | | |
| 10 | US 60 about 3 miles southeast of Goldfield Road | 900 | 84 | 7 | 1 | 0 | 8 |
| 11 | Ocotillo Road east of Meridian Road | 380 | 34 | 3 | 1 | 0 | 4 |
| 12 | Ritternhouse Road south of Hunt Highway | 410 | 37 | 3 | 1 | 1 | 5 |
| 13 | Hunt Highway 1.7 miles east of Ellsworth Road | 410 | 37 | 3 | 1 | 1 | 5 |
| 14 | Power Road 1.5 miles south of Hunt Highway | | | Site Dropped | | | |
| 15 | Gilbert Road south of Hunt Highway | | | Counts Only | | | |
| 16 | SR 87 at SR87/SR587 Junction | 440 | 39 | 3 | 1 | 1 | 5 |
| 17 | I-10 south of Hunt Highway | 910 | 87 | 7 | 2 | 1 | 10 |
| 18 | SR 347/Maricopa Road south of Hunt Highway | 440 | 40 | 3 | 1 | 1 | 5 |

**Table 5a**
**Hourly Survey Targets**
**Site 1**
**Site Name: SR-85 at Patterson Road**
**Survey Date: 9/30**

Two Way Volume: 9000 One-Way Volume: 4500
Number of Surveyors: 3 Samples Required: 440

| Time of Day | Estimated Outbound Volume | Number of Samples | Percent of Outbound Volume Sampled | Confidence Interval[1] |
|---|---|---|---|---|
| 0:00-0:59 | 44 | None Taken | 0.0% | N/A |
| 1:00-1:59 | 24 | None Taken | 0.0% | N/A |
| 2:00-2:59 | 23 | None Taken | 0.0% | N/A |
| 3:00-3:59 | 12 | None Taken | 0.0% | N/A |
| 4:00-4:59 | 14 | None Taken | 0.0% | N/A |
| 5:00-5:59 | 22 | None Taken | 0.0% | N/A |
| 6:00-6:59 | 75 | None Taken | 0.0% | N/A |
| 7:00-7:59 | 177 | 41 | 23.2% | ±0.1345 |
| 8:00-8:59 | 252 | 41 | 16.3% | ±0.1403 |
| 9:00-9:59 | 219 | 41 | 18.7% | ±0.1383 |
| 10:00-10:59 | 213 | 41 | 19.2% | ±0.1379 |
| 11:00-11:59 | 224 | 41 | 18.3% | ±0.1386 |
| 12:00-12:59 | 216 | 41 | 19.0% | ±0.1381 |
| 13:00-13:59 | 247 | 41 | 16.6% | ±0.1401 |
| 14:00-14:59 | 254 | 41 | 16.1% | ±0.1404 |
| 15:00-15:59 | 308 | 41 | 13.3% | ±0.1427 |
| 16:00-16:59 | 412 | 41 | 10.0% | ±0.1454 |
| 17:00-17:59 | 477 | 30 | 6.3% | ±0.1734 |
| 18:00-18:59 | 495 | None Taken | 0.0% | N/A |
| 19:00-19:59 | 259 | None Taken | 0.0% | N/A |
| 20:00-20:59 | 185 | None Taken | 0.0% | N/A |
| 21:00-21:59 | 144 | None Taken | 0.0% | N/A |
| 22:00-22:59 | 126 | None Taken | 0.0% | N/A |
| 23:00-23:59 | 79 | None Taken | 0.0% | N/A |
| **TOTAL** | **4500** | **440** | **9.8%** | |

[1] Confidence interval at 95% confidence level of a proporation of 0.50.

**Table 5b**
**Hourly Survey Targets**
**Site 2**
**Site Name: Old US 80 at Gila River**
**Survey Date: 9/14**

| Two Way Volume: 1000 | | One-Way Volume: 500 | | |
|---|---|---|---|---|
| Number of Surveyors: 2 | | Samples Required: 330 | | |
| **Time of Day** | **Estimated Outbound Volume** | **Number of Samples** | **Percent of Outbound Volume Sampled** | **Confidence Interval[1]** |
| 0:00-0:59 | 4 | None Taken | 0.0% | N/A |
| 1:00-1:59 | 2 | None Taken | 0.0% | N/A |
| 2:00-2:59 | 1 | None Taken | 0.0% | N/A |
| 3:00-3:59 | 2 | None Taken | 0.0% | N/A |
| 4:00-4:59 | 3 | None Taken | 0.0% | N/A |
| 5:00-5:59 | 7 | None Taken | 0.0% | N/A |
| 6:00-6:59 | 23 | 8 | 34.8% | ±0.2861 |
| 7:00-7:59 | 37 | 33 | 89.2% | ±0.0569 |
| 8:00-8:59 | 37 | 34 | 91.9% | ±0.0485 |
| 9:00-9:59 | 29 | 29 | 100.0% | ±0 |
| 10:00-10:59 | 26 | 26 | 100.0% | ±0 |
| 11:00-11:59 | 24 | 24 | 100.0% | ±0 |
| 12:00-12:59 | 27 | 27 | 100.0% | ±0 |
| 13:00-13:59 | 24 | 24 | 100.0% | ±0 |
| 14:00-14:59 | 26 | 26 | 100.0% | ±0 |
| 15:00-15:59 | 31 | 31 | 100.0% | ±0 |
| 16:00-16:59 | 36 | 34 | 94.4% | ±0.0402 |
| 17:00-17:59 | 45 | 34 | 75.6% | ±0.0840 |
| 18:00-18:59 | 40 | None Taken | 0.0% | N/A |
| 19:00-19:59 | 31 | None Taken | 0.0% | N/A |
| 20:00-20:59 | 18 | None Taken | 0.0% | N/A |
| 21:00-21:59 | 12 | None Taken | 0.0% | N/A |
| 22:00-22:59 | 10 | None Taken | 0.0% | N/A |
| 23:00-23:59 | 6 | None Taken | 0.0% | N/A |
| **TOTAL** | **500** | **330** | **66.0%** | |

[1] Confidence interval at 95% confidence level of a proporation of 0.50.

**Table 5c**
**Hourly Survey Targets**
**Site 3**
**Site Name: Salome Highway east of Courthouse Road**
**Survey Date: 9/15**

| Two Way Volume: 1000 | | One-Way Volume: 500 | | |
|---|---|---|---|---|
| Number of Surveyors: 2 | | Samples Required: 330 | | |
| **Time of Day** | **Estimated Outbound Volume** | **Number of Samples** | **Percent of Outbound Volume Sampled** | **Confidence Interval[1]** |
| 0:00-0:59 | 4 | None Taken | 0.0% | N/A |
| 1:00-1:59 | 2 | None Taken | 0.0% | N/A |
| 2:00-2:59 | 1 | None Taken | 0.0% | N/A |
| 3:00-3:59 | 2 | None Taken | 0.0% | N/A |
| 4:00-4:59 | 3 | None Taken | 0.0% | N/A |
| 5:00-5:59 | 7 | None Taken | 0.0% | N/A |
| 6:00-6:59 | 23 | 8 | 34.8% | ±0.2861 |
| 7:00-7:59 | 37 | 33 | 89.2% | ±0.0569 |
| 8:00-8:59 | 37 | 34 | 91.9% | ±0.0485 |
| 9:00-9:59 | 29 | 29 | 100.0% | ±0 |
| 10:00-10:59 | 26 | 26 | 100.0% | ±0 |
| 11:00-11:59 | 24 | 24 | 100.0% | ±0 |
| 12:00-12:59 | 27 | 27 | 100.0% | ±0 |
| 13:00-13:59 | 24 | 24 | 100.0% | ±0 |
| 14:00-14:59 | 26 | 26 | 100.0% | ±0 |
| 15:00-15:59 | 31 | 31 | 100.0% | ±0 |
| 16:00-16:59 | 36 | 34 | 94.4% | ±0.0402 |
| 17:00-17:59 | 45 | 34 | 75.6% | ±0.0840 |
| 18:00-18:59 | 40 | None Taken | 0.0% | N/A |
| 19:00-19:59 | 31 | None Taken | 0.0% | N/A |
| 20:00-20:59 | 18 | None Taken | 0.0% | N/A |
| 21:00-21:59 | 12 | None Taken | 0.0% | N/A |
| 22:00-22:59 | 10 | None Taken | 0.0% | N/A |
| 23:00-23:59 | 6 | None Taken | 0.0% | N/A |
| **TOTAL** | **500** | **330** | **66.0%** | |

[1] Confidence interval at 95% confidence level of a proporation of 0.50.

**Table 5d**
**Hourly Survey Targets**
**Site 4**
**Site Name: I-10 at 477th Avenue**
**Survey Date: 10/5**

Two Way Volume: 15000 One-Way Volume: 7500
Number of Surveyors: 7 Samples Required: 900

| Time of Day | Estimated Outbound Volume | Number of Samples | Percent Outbound Volume Sampled | Confidence Interval[1] |
|---|---|---|---|---|
| 0:00-0:59 | 112 | None Taken | 0.0% | N/A |
| 1:00-1:59 | 110 | None Taken | 0.0% | N/A |
| 2:00-2:59 | 102 | None Taken | 0.0% | N/A |
| 3:00-3:59 | 77 | None Taken | 0.0% | N/A |
| 4:00-4:59 | 75 | None Taken | 0.0% | N/A |
| 5:00-5:59 | 144 | None Taken | 0.0% | N/A |
| 6:00-6:59 | 177 | None Taken | 0.0% | N/A |
| 7:00-7:59 | 260 | 86 | 33.1% | ±0.0866 |
| 8:00-8:59 | 405 | 86 | 21.2% | ±0.0939 |
| 9:00-9:59 | 354 | 86 | 24.3% | ±0.0921 |
| 10:00-10:59 | 484 | 86 | 17.8% | ±0.0959 |
| 11:00-11:59 | 476 | 86 | 18.1% | ±0.0958 |
| 12:00-12:59 | 490 | 85 | 17.3% | ±0.0967 |
| 13:00-13:59 | 510 | 85 | 16.7% | ±0.0971 |
| 14:00-14:59 | 488 | 86 | 17.6% | ±0.0960 |
| 15:00-15:59 | 460 | 86 | 18.7% | ±0.0954 |
| 16:00-16:59 | 462 | 86 | 18.6% | ±0.0954 |
| 17:00-17:59 | 451 | 42 | 9.3% | ±0.1442 |
| 18:00-18:59 | 413 | None Taken | 0.0% | N/A |
| 19:00-19:59 | 368 | None Taken | 0.0% | N/A |
| 20:00-20:59 | 331 | None Taken | 0.0% | N/A |
| 21:00-21:59 | 273 | None Taken | 0.0% | N/A |
| 22:00-22:59 | 285 | None Taken | 0.0% | N/A |
| 23:00-23:59 | 193 | None Taken | 0.0% | N/A |
| **TOTAL** | **7500** | **900** | **12.0%** | |

[1] Confidence interval at 95% confidence level of a proporation of 0.50.

**Table 5e**
**Hourly Survey Targets**
**Site 5**
**Site Name: US 60 at 355th Avenue**
**Survey Date: 9/16**

| Two Way Volume: 2000 | One-Way Volume: 1000 | | | |
|---|---|---|---|---|
| Number of Surveyors: 3 | Samples Required: 380 | | | |
| **Time of Day** | **Estimated Outbound Volume** | **Number of Samples** | **Percent Outbound Volume Sampled** | **Confidence Interval[1]** |
| 0:00-0:59 | 7 | None Taken | 0.0% | N/A |
| 1:00-1:59 | 4 | None Taken | 0.0% | N/A |
| 2:00-2:59 | 2 | None Taken | 0.0% | N/A |
| 3:00-3:59 | 4 | None Taken | 0.0% | N/A |
| 4:00-4:59 | 5 | None Taken | 0.0% | N/A |
| 5:00-5:59 | 15 | None Taken | 0.0% | N/A |
| 6:00-6:59 | 46 | 8 | 17.4% | ±0.3184 |
| 7:00-7:59 | 75 | 34 | 45.3% | ±0.1251 |
| 8:00-8:59 | 74 | 34 | 45.9% | ±0.1244 |
| 9:00-9:59 | 57 | 34 | 59.6% | ±0.1077 |
| 10:00-10:59 | 52 | 33 | 63.5% | ±0.1041 |
| 11:00-11:59 | 48 | 33 | 68.8% | ±0.0964 |
| 12:00-12:59 | 54 | 34 | 63.0% | ±0.1032 |
| 13:00-13:59 | 47 | 34 | 72.3% | ±0.0893 |
| 14:00-14:59 | 53 | 34 | 64.2% | ±0.1016 |
| 15:00-15:59 | 61 | 34 | 55.7% | ±0.1127 |
| 16:00-16:59 | 72 | 34 | 47.2% | ±0.1230 |
| 17:00-17:59 | 90 | 34 | 37.8% | ±0.1333 |
| 18:00-18:59 | 80 | None Taken | 0.0% | N/A |
| 19:00-19:59 | 62 | None Taken | 0.0% | N/A |
| 20:00-20:59 | 35 | None Taken | 0.0% | N/A |
| 21:00-21:59 | 24 | None Taken | 0.0% | N/A |
| 22:00-22:59 | 20 | None Taken | 0.0% | N/A |
| 23:00-23:59 | 11 | None Taken | 0.0% | N/A |
| **TOTAL** | **1000** | **380** | **38.0%** | |

[1] Confidence interval at 95% confidence level of a proporation of 0.50.

**Table 5f**
**Hourly Survey Targets**
**Site 6**
**Site Name: US 93 at Maricopa/Yavapai County Boundary**
**Survey Date: 9/23**

| Two Way Volume: 6000 | | One-Way Volume: 3000 | | |
|---|---|---|---|---|
| Number of Surveyors: 3 | | Samples Required: 430 | | |
| **Time of Day** | **Estimated Outbound Volume** | **Number of Samples** | **Percent Outbound Volume Sampled** | **Confidence Interval[1]** |
| 0:00-0:59 | 29 | None Taken | 0.0% | N/A |
| 1:00-1:59 | 16 | None Taken | 0.0% | N/A |
| 2:00-2:59 | 15 | None Taken | 0.0% | N/A |
| 3:00-3:59 | 8 | None Taken | 0.0% | N/A |
| 4:00-4:59 | 9 | None Taken | 0.0% | N/A |
| 5:00-5:59 | 14 | None Taken | 0.0% | N/A |
| 6:00-6:59 | 50 | 10 | 20.0% | ±0.2800 |
| 7:00-7:59 | 118 | 38 | 32.2% | ±0.1315 |
| 8:00-8:59 | 168 | 38 | 22.6% | ±0.1403 |
| 9:00-9:59 | 146 | 38 | 26.0% | ±0.1372 |
| 10:00-10:59 | 142 | 38 | 26.8% | ±0.1365 |
| 11:00-11:59 | 149 | 38 | 25.5% | ±0.1377 |
| 12:00-12:59 | 144 | 38 | 26.4% | ±0.1369 |
| 13:00-13:59 | 165 | 38 | 23.0% | ±0.1399 |
| 14:00-14:59 | 169 | 38 | 22.5% | ±0.1404 |
| 15:00-15:59 | 206 | 38 | 18.4% | ±0.1439 |
| 16:00-16:59 | 275 | 39 | 14.2% | ±0.1456 |
| 17:00-17:59 | 318 | 39 | 12.3% | ±0.1472 |
| 18:00-18:59 | 330 | None Taken | 0.0% | N/A |
| 19:00-19:59 | 172 | None Taken | 0.0% | N/A |
| 20:00-20:59 | 123 | None Taken | 0.0% | N/A |
| 21:00-21:59 | 96 | None Taken | 0.0% | N/A |
| 22:00-22:59 | 84 | None Taken | 0.0% | N/A |
| 23:00-23:59 | 53 | None Taken | 0.0% | N/A |
| **TOTAL** | **3000** | **430** | **14.3%** | |

[1] Confidence interval at 95% confidence level of a proporation of 0.50.

**Table 5g**
**Hourly Survey Targets**
**Site 7**
**Site Name: I-17 at Maricopa/Yavapai County Boundary**
**Survey Date: 10/7**

| Two Way Volume: 30000 | | One-Way Volume: 15000 | | |
|---|---|---|---|---|
| Number of Surveyors: 7 | | Samples Required: 910 | | |
| **Time of Day** | **Estimated Outbound Volume** | **Number of Samples** | **Percent of Outbound Volume Sampled** | **Confidence Interval[1]** |
| 0:00-0:59 | 239 | None Taken | 0.0% | N/A |
| 1:00-1:59 | 135 | None Taken | 0.0% | N/A |
| 2:00-2:59 | 99 | None Taken | 0.0% | N/A |
| 3:00-3:59 | 78 | None Taken | 0.0% | N/A |
| 4:00-4:59 | 127 | None Taken | 0.0% | N/A |
| 5:00-5:59 | 222 | None Taken | 0.0% | N/A |
| 6:00-6:59 | 457 | None Taken | 0.0% | N/A |
| 7:00-7:59 | 774 | 86 | 11.1% | ±0.0997 |
| 8:00-8:59 | 808 | 86 | 10.6% | ±0.1000 |
| 9:00-9:59 | 861 | 87 | 10.1% | ±0.0997 |
| 10:00-10:59 | 868 | 87 | 10.0% | ±0.0997 |
| 11:00-11:59 | 818 | 86 | 10.5% | ±0.1000 |
| 12:00-12:59 | 774 | 86 | 11.1% | ±0.0997 |
| 13:00-13:59 | 757 | 86 | 11.4% | ±0.0996 |
| 14:00-14:59 | 805 | 86 | 10.7% | ±0.0999 |
| 15:00-15:59 | 862 | 87 | 10.1% | ±0.0997 |
| 16:00-16:59 | 1127 | 89 | 7.9% | ±0.0997 |
| 17:00-17:59 | 1288 | 44 | 3.4% | ±0.1453 |
| 18:00-18:59 | 1164 | None Taken | 0.0% | N/A |
| 19:00-19:59 | 824 | None Taken | 0.0% | N/A |
| 20:00-20:59 | 551 | None Taken | 0.0% | N/A |
| 21:00-21:59 | 481 | None Taken | 0.0% | N/A |
| 22:00-22:59 | 459 | None Taken | 0.0% | N/A |
| 23:00-23:59 | 421 | None Taken | 0.0% | N/A |
| **TOTAL** | **15000** | **910** | **6.1%** | |

[1] Confidence interval at 95% confidence level of a proporation of 0.50.

**Table 5h**
**Hourly Survey Targets**
**Site 8**
**Site Name: SR 87/Beeline Highway east of Bush Highway**
**Survey Date: 9/28**

| Two Way Volume: 7000 | | One-Way Volume: 3500 | | |
|---|---|---|---|---|
| Number of Surveyors: 3 | | Samples Required: 430 | | |
| **Time of Day** | **Estimated Outbound Volume** | **Number of Samples** | **Percent of Outbound Volume Sampled** | **Confidence Interval[1]** |
| 0:00-0:59 | 34 | None Taken | 0.0% | N/A |
| 1:00-1:59 | 18 | None Taken | 0.0% | N/A |
| 2:00-2:59 | 18 | None Taken | 0.0% | N/A |
| 3:00-3:59 | 10 | None Taken | 0.0% | N/A |
| 4:00-4:59 | 11 | None Taken | 0.0% | N/A |
| 5:00-5:59 | 17 | None Taken | 0.0% | N/A |
| 6:00-6:59 | 58 | 10 | 17.2% | ±0.2844 |
| 7:00-7:59 | 138 | 39 | 28.3% | ±0.1334 |
| 8:00-8:59 | 196 | 39 | 19.9% | ±0.1408 |
| 9:00-9:59 | 171 | 39 | 22.8% | ±0.1383 |
| 10:00-10:59 | 166 | 39 | 23.5% | ±0.1377 |
| 11:00-11:59 | 174 | 39 | 22.4% | ±0.1386 |
| 12:00-12:59 | 168 | 39 | 23.2% | ±0.1379 |
| 13:00-13:59 | 192 | 39 | 20.3% | ±0.1405 |
| 14:00-14:59 | 198 | 39 | 19.7% | ±0.1410 |
| 15:00-15:59 | 240 | 39 | 16.3% | ±0.1439 |
| 16:00-16:59 | 321 | 39 | 12.1% | ±0.1473 |
| 17:00-17:59 | 371 | 30 | 8.1% | ±0.1718 |
| 18:00-18:59 | 385 | None Taken | 0.0% | N/A |
| 19:00-19:59 | 201 | None Taken | 0.0% | N/A |
| 20:00-20:59 | 144 | None Taken | 0.0% | N/A |
| 21:00-21:59 | 112 | None Taken | 0.0% | N/A |
| 22:00-22:59 | 98 | None Taken | 0.0% | N/A |
| 23:00-23:59 | 61 | None Taken | 0.0% | N/A |
| **TOTAL** | **3500** | **430** | **12.3%** | |

[1] Confidence interval at 95% confidence level of a proporation of 0.50.

**Table 5i**
**Hourly Survey Targets**
**Site 10**
**Site Name: US 60 about 3 miles southeast of Goldfield Road**
**Survey Date: 10/6**

| Two Way Volume: 16000 | | One-Way Volume: 8000 | | |
|---|---|---|---|---|
| Number of Surveyors: 7 | | Samples Required: 900 | | |
| **Time of Day** | **Estimated Outbound Volume** | **Number of Samples** | **Percent of Outbound Volume Sampled** | **Confidence Interval[1]** |
| 0:00-0:59 | 78 | None Taken | 0.0% | N/A |
| 1:00-1:59 | 42 | None Taken | 0.0% | N/A |
| 2:00-2:59 | 40 | None Taken | 0.0% | N/A |
| 3:00-3:59 | 22 | None Taken | 0.0% | N/A |
| 4:00-4:59 | 25 | None Taken | 0.0% | N/A |
| 5:00-5:59 | 38 | None Taken | 0.0% | N/A |
| 6:00-6:59 | 133 | None Taken | 0.0% | N/A |
| 7:00-7:59 | 315 | 85 | 27.0% | ±0.0910 |
| 8:00-8:59 | 448 | 86 | 19.2% | ±0.0951 |
| 9:00-9:59 | 390 | 85 | 21.8% | ±0.0941 |
| 10:00-10:59 | 379 | 85 | 22.4% | ±0.0937 |
| 11:00-11:59 | 398 | 85 | 21.4% | ±0.0944 |
| 12:00-12:59 | 384 | 85 | 22.1% | ±0.0939 |
| 13:00-13:59 | 440 | 86 | 19.5% | ±0.0949 |
| 14:00-14:59 | 451 | 86 | 19.1% | ±0.0952 |
| 15:00-15:59 | 548 | 87 | 15.9% | ±0.0965 |
| 16:00-16:59 | 733 | 87 | 11.9% | ±0.0987 |
| 17:00-17:59 | 848 | 43 | 5.1% | ±0.1457 |
| 18:00-18:59 | 880 | None Taken | 0.0% | N/A |
| 19:00-19:59 | 460 | None Taken | 0.0% | N/A |
| 20:00-20:59 | 329 | None Taken | 0.0% | N/A |
| 21:00-21:59 | 255 | None Taken | 0.0% | N/A |
| 22:00-22:59 | 224 | None Taken | 0.0% | N/A |
| 23:00-23:59 | 140 | None Taken | 0.0% | N/A |
| **TOTAL** | **8000** | **900** | **11.3%** | |

[1] Confidence interval at 95% confidence level of a proporation of 0.50.

**Table 5j**
**Hourly Survey Targets**
**Site 11**
**Site Name: Ocotillo Road east of Meridian Road**
**Survey Date: 9/22**

Two Way Volume: 2000 One-Way Volume: 1000
Number of Surveyors: 3 Samples Required: 380

| Time of Day | Estimated Outbound Volume | Number of Samples | Percent Outbound Volume Sampled | Confidence Interval[1] |
|---|---|---|---|---|
| 0:00-0:59 | 7 | None Taken | 0.0% | N/A |
| 1:00-1:59 | 4 | None Taken | 0.0% | N/A |
| 2:00-2:59 | 2 | None Taken | 0.0% | N/A |
| 3:00-3:59 | 4 | None Taken | 0.0% | N/A |
| 4:00-4:59 | 5 | None Taken | 0.0% | N/A |
| 5:00-5:59 | 15 | None Taken | 0.0% | N/A |
| 6:00-6:59 | 46 | 8 | 17.4% | ±0.3184 |
| 7:00-7:59 | 75 | 34 | 45.3% | ±0.1251 |
| 8:00-8:59 | 74 | 34 | 45.9% | ±0.1244 |
| 9:00-9:59 | 57 | 34 | 59.6% | ±0.1077 |
| 10:00-10:59 | 52 | 33 | 63.5% | ±0.1041 |
| 11:00-11:59 | 48 | 33 | 68.8% | ±0.0964 |
| 12:00-12:59 | 54 | 34 | 63.0% | ±0.1032 |
| 13:00-13:59 | 47 | 34 | 72.3% | ±0.0893 |
| 14:00-14:59 | 53 | 34 | 64.2% | ±0.1016 |
| 15:00-15:59 | 61 | 34 | 55.7% | ±0.1127 |
| 16:00-16:59 | 72 | 34 | 47.2% | ±0.1230 |
| 17:00-17:59 | 90 | 34 | 37.8% | ±0.1333 |
| 18:00-18:59 | 80 | None Taken | 0.0% | N/A |
| 19:00-19:59 | 62 | None Taken | 0.0% | N/A |
| 20:00-20:59 | 35 | None Taken | 0.0% | N/A |
| 21:00-21:59 | 24 | None Taken | 0.0% | N/A |
| 22:00-22:59 | 20 | None Taken | 0.0% | N/A |
| 23:00-23:59 | 11 | None Taken | 0.0% | N/A |
| **TOTAL** | **1000** | **380** | **38.0%** | |

[1] Confidence interval at 95% confidence level of a proporation of 0.50.

**Table 5k**
**Hourly Survey Targets**
**Site 12**
**Site Name: Rittenhouse Road south of Hunt Highway**
**Survey Date: 9/21**

Two Way Volume: 3000 One-Way Volume: 1500
Number of Surveyors: 3 Samples Required: 410

| Time of Day | Estimated Outbound Volume | Number of Samples | Percent of Outbound Volume Sampled | Confidence Interval[1] |
|---|---|---|---|---|
| 0:00-0:59 | 11 | None Taken | 0.0% | N/A |
| 1:00-1:59 | 6 | None Taken | 0.0% | N/A |
| 2:00-2:59 | 4 | None Taken | 0.0% | N/A |
| 3:00-3:59 | 5 | None Taken | 0.0% | N/A |
| 4:00-4:59 | 8 | None Taken | 0.0% | N/A |
| 5:00-5:59 | 22 | None Taken | 0.0% | N/A |
| 6:00-6:59 | 69 | 9 | 13.0% | ±0.3068 |
| 7:00-7:59 | 112 | 37 | 33.0% | ±0.1324 |
| 8:00-8:59 | 112 | 37 | 33.0% | ±0.1324 |
| 9:00-9:59 | 86 | 36 | 41.9% | ±0.1253 |
| 10:00-10:59 | 78 | 36 | 46.2% | ±0.1206 |
| 11:00-11:59 | 72 | 36 | 50.0% | ±0.1163 |
| 12:00-12:59 | 82 | 36 | 43.9% | ±0.1231 |
| 13:00-13:59 | 71 | 36 | 50.7% | ±0.1155 |
| 14:00-14:59 | 79 | 36 | 45.6% | ±0.1213 |
| 15:00-15:59 | 92 | 37 | 40.2% | ±0.1253 |
| 16:00-16:59 | 109 | 37 | 33.9% | ±0.1315 |
| 17:00-17:59 | 135 | 37 | 27.4% | ±0.1378 |
| 18:00-18:59 | 120 | None Taken | 0.0% | N/A |
| 19:00-19:59 | 93 | None Taken | 0.0% | N/A |
| 20:00-20:59 | 53 | None Taken | 0.0% | N/A |
| 21:00-21:59 | 36 | None Taken | 0.0% | N/A |
| 22:00-22:59 | 30 | None Taken | 0.0% | N/A |
| 23:00-23:59 | 17 | None Taken | 0.0% | N/A |
| **TOTAL** | **1500** | **410** | **27.3%** | |

[1] Confidence interval at 95% confidence level of a proporation of 0.50.

**Table 5l**
**Hourly Survey Targets**
**Site 13**
**Site Name: Hunt Highway 1.5 miles east of Ellsworth Road**
**Survey Date: 9/21**

| Two Way Volume: 3000 | | One-Way Volume: 1500 | | |
|---|---|---|---|---|
| Number of Surveyors: 3 | | Samples Required: 410 | | |
| **Time of Day** | **Estimated Outbound Volume** | **Number of Samples** | **Percent of Outbound Volume Sampled** | **Confidence Interval[1]** |
| 0:00-0:59 | 11 | None Taken | 0.0% | N/A |
| 1:00-1:59 | 6 | None Taken | 0.0% | N/A |
| 2:00-2:59 | 4 | None Taken | 0.0% | N/A |
| 3:00-3:59 | 5 | None Taken | 0.0% | N/A |
| 4:00-4:59 | 8 | None Taken | 0.0% | N/A |
| 5:00-5:59 | 22 | None Taken | 0.0% | N/A |
| 6:00-6:59 | 69 | 9 | 13.0% | ±0.3068 |
| 7:00-7:59 | 112 | 37 | 33.0% | ±0.1324 |
| 8:00-8:59 | 112 | 37 | 33.0% | ±0.1324 |
| 9:00-9:59 | 86 | 36 | 41.9% | ±0.1253 |
| 10:00-10:59 | 78 | 36 | 46.2% | ±0.1206 |
| 11:00-11:59 | 72 | 36 | 50.0% | ±0.1163 |
| 12:00-12:59 | 82 | 36 | 43.9% | ±0.1231 |
| 13:00-13:59 | 71 | 36 | 50.7% | ±0.1155 |
| 14:00-14:59 | 79 | 36 | 45.6% | ±0.1213 |
| 15:00-15:59 | 92 | 37 | 40.2% | ±0.1253 |
| 16:00-16:59 | 109 | 37 | 33.9% | ±0.1315 |
| 17:00-17:59 | 135 | 37 | 27.4% | ±0.1378 |
| 18:00-18:59 | 120 | None Taken | 0.0% | N/A |
| 19:00-19:59 | 93 | None Taken | 0.0% | N/A |
| 20:00-20:59 | 53 | None Taken | 0.0% | N/A |
| 21:00-21:59 | 36 | None Taken | 0.0% | N/A |
| 22:00-22:59 | 30 | None Taken | 0.0% | N/A |
| 23:00-23:59 | 17 | None Taken | 0.0% | N/A |
| **TOTAL** | **1500** | **410** | **27.3%** | |

[1] Confidence interval at 95% confidence level of a proporation of 0.50.

**Table 5m**
**Hourly Survey Targets**
**Site 16**
**Site Name: SR 87 at SR87/SR587 Junction**
**Survey Date: 9/22**

Two Way Volume: 8000 One-Way Volume: 4000
Number of Surveyors: 3 Samples Required: 440

| Time of Day | Estimated Outbound Volume | Number of Samples | Percent of Outbound Volume Sampled | Confidence Interval[1] |
|---|---|---|---|---|
| 0:00-0:59 | 39 | None Taken | 0.0% | N/A |
| 1:00-1:59 | 21 | None Taken | 0.0% | N/A |
| 2:00-2:59 | 20 | None Taken | 0.0% | N/A |
| 3:00-3:59 | 11 | None Taken | 0.0% | N/A |
| 4:00-4:59 | 12 | None Taken | 0.0% | N/A |
| 5:00-5:59 | 19 | None Taken | 0.0% | N/A |
| 6:00-6:59 | 66 | 10 | 15.2% | ±0.2876 |
| 7:00-7:59 | 157 | 39 | 24.8% | ±0.1365 |
| 8:00-8:59 | 224 | 39 | 17.4% | ±0.1429 |
| 9:00-9:59 | 195 | 39 | 20.0% | ±0.1407 |
| 10:00-10:59 | 189 | 39 | 20.6% | ±0.1402 |
| 11:00-11:59 | 199 | 39 | 19.6% | ±0.1411 |
| 12:00-12:59 | 192 | 39 | 20.3% | ±0.1405 |
| 13:00-13:59 | 220 | 39 | 17.7% | ±0.1427 |
| 14:00-14:59 | 226 | 39 | 17.3% | ±0.1431 |
| 15:00-15:59 | 274 | 39 | 14.2% | ±0.1456 |
| 16:00-16:59 | 367 | 39 | 10.6% | ±0.1486 |
| 17:00-17:59 | 424 | 40 | 9.4% | ±0.1476 |
| 18:00-18:59 | 440 | None Taken | 0.0% | N/A |
| 19:00-19:59 | 230 | None Taken | 0.0% | N/A |
| 20:00-20:59 | 165 | None Taken | 0.0% | N/A |
| 21:00-21:59 | 128 | None Taken | 0.0% | N/A |
| 22:00-22:59 | 112 | None Taken | 0.0% | N/A |
| 23:00-23:59 | 70 | None Taken | 0.0% | N/A |
| **TOTAL** | **4000** | **440** | **11.0%** | |

[1] Confidence interval at 95% confidence level of a proporation of 0.50.

**Table 5n**
**Hourly Survey Targets**
**Site 17**
**Site Name: I-10 south of Hunt Highway**
**Survey Date: 10/12**

| Two Way Volume: 37000 | | One-Way Volume: 18500 | | |
|---|---|---|---|---|
| Number of Surveyors: 7 | | Samples Required: 910 | | |
| **Time of Day** | **Estimated Outbound Volume** | **Number of Samples** | **Percent of Outbound Volume Sampled** | **Confidence Interval[1]** |
| 0:00-0:59 | 294 | None Taken | 0.0% | N/A |
| 1:00-1:59 | 166 | None Taken | 0.0% | N/A |
| 2:00-2:59 | 122 | None Taken | 0.0% | N/A |
| 3:00-3:59 | 97 | None Taken | 0.0% | N/A |
| 4:00-4:59 | 157 | None Taken | 0.0% | N/A |
| 5:00-5:59 | 274 | None Taken | 0.0% | N/A |
| 6:00-6:59 | 563 | None Taken | 0.0% | N/A |
| 7:00-7:59 | 955 | 86 | 9.0% | ±0.1009 |
| 8:00-8:59 | 997 | 86 | 8.6% | ±0.1011 |
| 9:00-9:59 | 1062 | 87 | 8.2% | ±0.1007 |
| 10:00-10:59 | 1070 | 87 | 8.1% | ±0.1008 |
| 11:00-11:59 | 1009 | 87 | 8.6% | ±0.1005 |
| 12:00-12:59 | 954 | 86 | 9.0% | ±0.1009 |
| 13:00-13:59 | 933 | 86 | 9.2% | ±0.1007 |
| 14:00-14:59 | 993 | 87 | 8.8% | ±0.1004 |
| 15:00-15:59 | 1063 | 87 | 8.2% | ±0.1007 |
| 16:00-16:59 | 1391 | 87 | 6.3% | ±0.1018 |
| 17:00-17:59 | 1589 | 44 | 2.8% | ±0.1457 |
| 18:00-18:59 | 1436 | None Taken | 0.0% | N/A |
| 19:00-19:59 | 1016 | None Taken | 0.0% | N/A |
| 20:00-20:59 | 679 | None Taken | 0.0% | N/A |
| 21:00-21:59 | 594 | None Taken | 0.0% | N/A |
| 22:00-22:59 | 566 | None Taken | 0.0% | N/A |
| 23:00-23:59 | 520 | None Taken | 0.0% | N/A |
| **TOTAL** | **18500** | **910** | **4.9%** | |

[1] Confidence interval at 95% confidence level of a proporation of 0.50.

**Table 5o**
**Hourly Survey Targets**
**Site 18**
**Site Name: SR 347/Maricopa Road south of Hunt Highway**
**Survey Date: 9/29**

Two Way Volume: 9000 One-Way Volume: 4500
Number of Surveyors: 3 Samples Required: 440

| Time of Day | Estimated Outbound Volume | Number of Samples | Percent of Outbound Volume Sampled | Confidence Interval[1] |
|---|---|---|---|---|
| 0:00-0:59 | 44 | None Taken | 0.0% | N/A |
| 1:00-1:59 | 24 | None Taken | 0.0% | N/A |
| 2:00-2:59 | 23 | None Taken | 0.0% | N/A |
| 3:00-3:59 | 12 | None Taken | 0.0% | N/A |
| 4:00-4:59 | 14 | None Taken | 0.0% | N/A |
| 5:00-5:59 | 22 | None Taken | 0.0% | N/A |
| 6:00-6:59 | 75 | 10 | 13.3% | ±0.2904 |
| 7:00-7:59 | 177 | 40 | 22.6% | ±0.1367 |
| 8:00-8:59 | 252 | 40 | 15.9% | ±0.1424 |
| 9:00-9:59 | 219 | 40 | 18.3% | ±0.1404 |
| 10:00-10:59 | 213 | 40 | 18.8% | ±0.1400 |
| 11:00-11:59 | 224 | 40 | 17.9% | ±0.1408 |
| 12:00-12:59 | 216 | 40 | 18.5% | ±0.1402 |
| 13:00-13:59 | 247 | 40 | 16.2% | ±0.1421 |
| 14:00-14:59 | 254 | 40 | 15.7% | ±0.1425 |
| 15:00-15:59 | 308 | 40 | 13.0% | ±0.1448 |
| 16:00-16:59 | 412 | 40 | 9.7% | ±0.1474 |
| 17:00-17:59 | 477 | 30 | 6.3% | ±0.1734 |
| 18:00-18:59 | 495 | None Taken | 0.0% | N/A |
| 19:00-19:59 | 259 | None Taken | 0.0% | N/A |
| 20:00-20:59 | 185 | None Taken | 0.0% | N/A |
| 21:00-21:59 | 144 | None Taken | 0.0% | N/A |
| 22:00-22:59 | 126 | None Taken | 0.0% | N/A |
| 23:00-23:59 | 79 | None Taken | 0.0% | N/A |
| **TOTAL** | **4500** | **440** | **9.8%** | |

[1] Confidence interval at 95% confidence level of a proporation of 0.50.

Pre-Interview Data: (recorded as vehicle approaches)

1. *Survey time.*

2. *Vehicle type*:

    1. Passenger car
    2. Pickup truck/Van/Mini-van/Sport Utility Vehicle
    3. Recreational vehicle (self-contained unit)
    4. Motorcycle

3. *Number of persons in vehicle:* The interviewer will observe how many people are in the vehicle, including infants. If the interviewer is unable to determine how many people are in the vehicle, he/she will ask the driver about the vehicle occupancy.

Interview Data: (recorded based on responses to questions)

4. *Is this vehicle owned or leased by a person or business?*

    1. Person
    2. Business

5. *In what state do you live?*

5a. In what county if state is Arizona?

6. *What is the name of the place where you last stopped? And, what is the address there?* This is the last place where a stop for an activity (e.g., home, work, eat, shop, rest stop, etc.) was made. If outside of Maricopa County, record the city and state, and determine the roadway used to enter the region. If the last activity location was within Maricopa County, record the establishment name for non-residential locations and the exact address (if not known, record the nearest cross-streets and building name, or the approximate distance from the external station site).

7. *What was your main purpose for being there?*

    1. Home
    2. Work (at normal place of work)
    3. Work-related (at other than normal place of work)
    4. Pick-up / Delivery
    5. School
    6. Social / recreational
    7. Shop
    8. Eat a meal
    9. Pick up / drop off a passenger
    10. Other (specify)

8. *What time did you leave that place?*

9. *Where are you going next (location)?* Repeat instructions from 6 (change “last” to “next”; drop clause r.e. roadway used to enter the area).

10. *What is your main purpose for going there?*

    1. Home
    2. Work (at normal place of work)
    3. Work-related (at other than normal place of work)
    4. Pick-up / Delivery
    5. School
    6. Social / recreational
    7. Shop
    8. Eat a meal
    9. Pick up / drop off a passenger
    10. Other (specify)

The proposed commercial vehicle/truck questionnaires will solicit the following information:

Survey Control Data

The purpose of the survey control data form is to provide basic information about each survey for survey tracking and quality control.

1. Questionnaire
2. Station Number
3. Station Location
4. Location
5. Day of Week
6. Date
7. Interviewer(s)

Pre-Interview Data (recorded as vehicle approaches)

1. *Survey time*.

2. *Vehicle Type:*

    1. Step-van
    2. Single Unit Truck 2 Axle
    3. Single Unit Truck 3+ Axle
    4. Combination Truck (1 Trailer)
    5. Combination Truck (2 or More Trailers)
    6. Bus

Interview Data (recorded based on responses to questions)

3. *What type of load are you carrying*?

    1. Empty
    2. Mixed (specify)
    3. Bulk (all the same commodity) - specify
    4. Liquid (specify)
    5. Other (specify)

4. *What is the name of the place where this vehicle is garaged*?

4a. And, what is the address?

5. *What is the vehicle owner's business*?

1. Agriculture
2. Forestry
3. Mining/Quarry
4. Construction
5. Manufacturing
6. Wholesale
7. Retail
8. Utilities
9. Services
10. Government
11. For-Hire/Shipping
12. Daily Rental
13. Other (specify)

6. *What is the name of the place where you last stopped*?

6a. And, what is the address there?

7. *What was your main purpose for being there*?

1. Pickup
2. Delivery
3. Shopping/Fuel
4. Eat
5. Sleep/Rest
6. Work
7. Base/Terminal
8. Vehicle Maintenance
9. Other (specify)

8. *What is the name of the place you are going next*?

8a. And, what is the address there?

9. *What will be your main purpose for being there*?

1. Pickup
2. Delivery
3. Shopping/Fuel
4. Eat
5. Sleep/Rest
6. Work
7. Base/Terminal
8. Vehicle Maintenance
9. Other (specify)

# Appendix B – Survey Station Layouts

# PHOENIX EXTERNAL TRAVEL SURVEY

## TECHNICAL MEMORANDUM
## TASK 3
## SURVEY STATION LAYOUTS

(Final)

Prepared for

Maricopa Association of Governments
302 North 1st Avenue, Suite 300
Phoenix, Arizona 85003

Prepared by

Parsons Transportation Group, Inc.
3875 N. 44th Street, Suite 250
Phoenix, Arizona 85018-5435

September 9, 1999

## Introduction

The Maricopa Association of Governments (MAG) is undertaking an External Travel Survey as part of its responsibility to maintain the regional travel demand forecasting model for the Phoenix metropolitan area. This vital tool is used for regional transportation planning and for supplying design volume forecasts for most major transportation projects undertaken by the Arizona Department of Transportation (ADOT), Maricopa County and municipalities within the region.

MAG is continuously involved in efforts to update the regional travel model. The external travel component of the model estimates travel through the region (external-external, or through, travel) and travel into and out-of the region (internal-external and external-internal travel). The area included in the regional travel model has increased significantly since the last update to the external travel model components in 1986. Thus, in addition to changes in external travel that may have occurred over time, there are changes in external travel due to the enlarged modeling area that must be properly reflected in the regional travel model. The results of the 1999 External Travel Survey will provide necessary input for developing high quality travel forecasts for the region.

The external survey will use the traditional intercept survey approach where information on the current trip being made will be collected. A sample of vehicles leaving the region will be surveyed at the external survey sites. Fifteen sites will be surveyed including each of the major highways that leave the region.

The purposes of this technical memorandum are as follows:

- to illustrate each of the fifteen external station sites that will be surveyed, and
- to show the traffic control requirements that are anticipated at each survey site.

The design of this external station survey is described in the technical memoranda for Task 2 (Sample Design), and Task 6 (Conduct Survey).

## Proposed Survey Locations

Roadside interviews will be conducted at 15 external stations along the perimeter of the MAG study area. These locations include three interstate highways, four US highways, five state highways, and six county roads. Traffic counts will be taken at two additional sites. The external stations to be surveyed and counted are shown on the location map on the following page. Table 1 lists the sites along with traffic counts and typical peak hour, peak direction volumes.

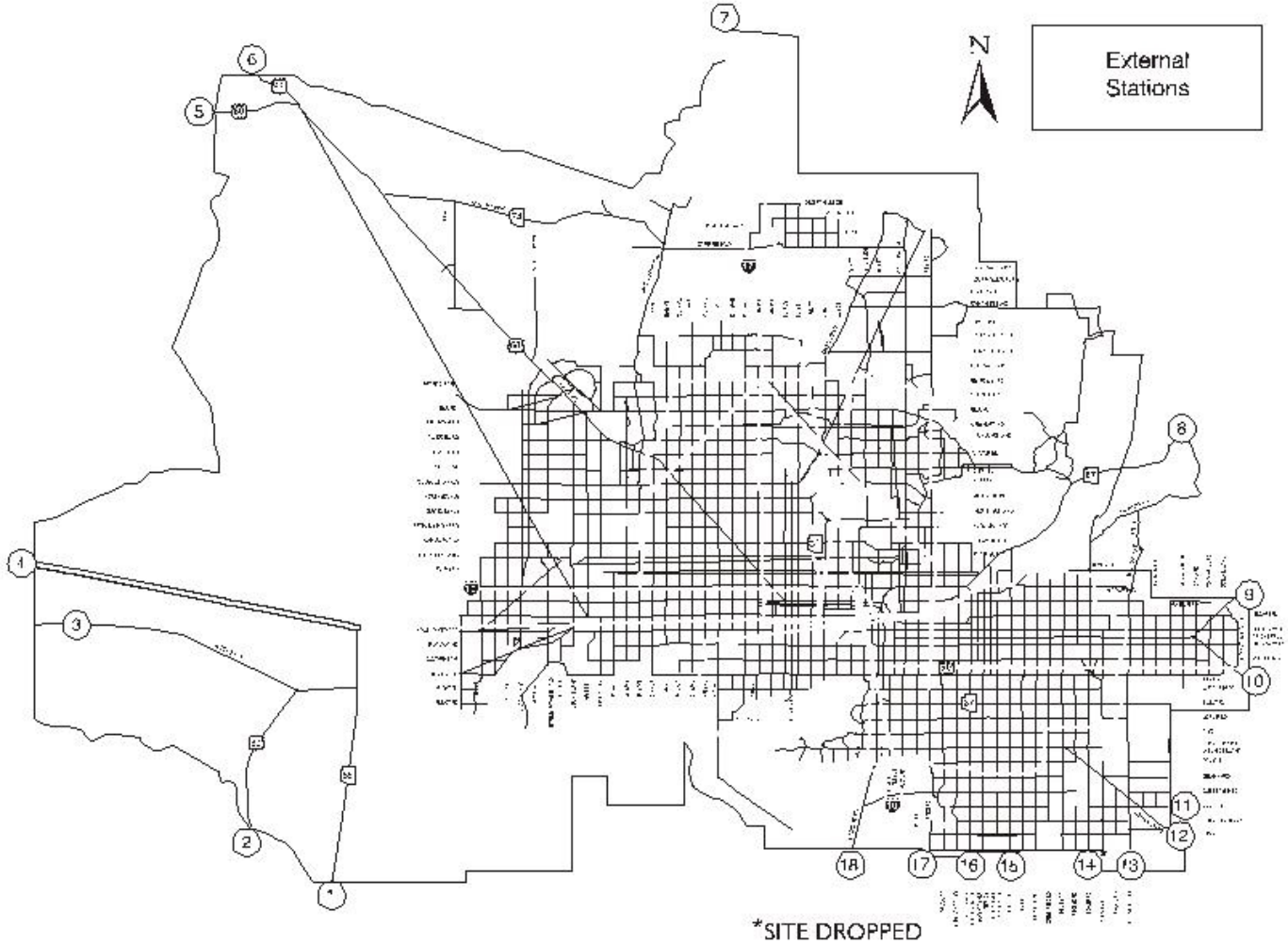

N
External Stations
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
*SITE DROPPED

**Table 1**
**Survey Sites and Traffic Volumes**

| Site Number | General Location | 2-way Average Daily Traffic | Typical Peak-Hour, Peak-Direction Volume[1] |
|---|---|---|---|
| 1 | SR-85 at Patterson Road | 9,000 | 430 |
| 2 | Old US 80 at Gila River | 1,000 | 50 |
| 3 | Salome Highway east of Courthouse Road | 1,000 | 50 |
| 4 | I-10 at 477th Avenue | 15,000 | 720 |
| 5 | US 60 at 355th Avenue | 2,000 | 100 |
| 6 | US 93 at Maricopa/Yavapai County Boundary | 6,000 | 290 |
| 7 | I-17 at Maricopa/Yavapai County Boundary | 30,000 | 1,440 |
| 8 | SR 87/Beeline Highway east of Bush Highway | 7,000 | 340 |
| 9[2] | SR 88 south of First Water Road | 5,000 | 240 |
| 10 | US 60 about 3 miles southeast of Goldfield Road | 16,000 | 770 |
| 11 | Ocotillo Road east of Meridian Road | 2,000 | 100 |
| 12 | Rittenhouse Road south of Hunt Highway | 3,000 | 140 |
| 13 | Hunt Highway 1.7 miles east of Ellsworth Road | 3,000 | 140 |
| | Power Road 1.5 miles south of Hunt Highway | Site Dropped[3] | |
| 14[2] | Gilbert Road south of Hunt Highway | 1,000 | 50 |
| 15 | SR 87 at SR87/SR587 Junction | 8,000 | 390 |
| 16 | I-10 south of Hunt Highway | 37,000 | 1,780 |
| 17 | SR 347/Maricopa Road south of Hunt Highway | 9,000 | 430 |

1 Based on traffic counts performed for an external station survey in Colorado, the peak hour factor is approximately 8 percent and the peak direction split factor is 60 percent.

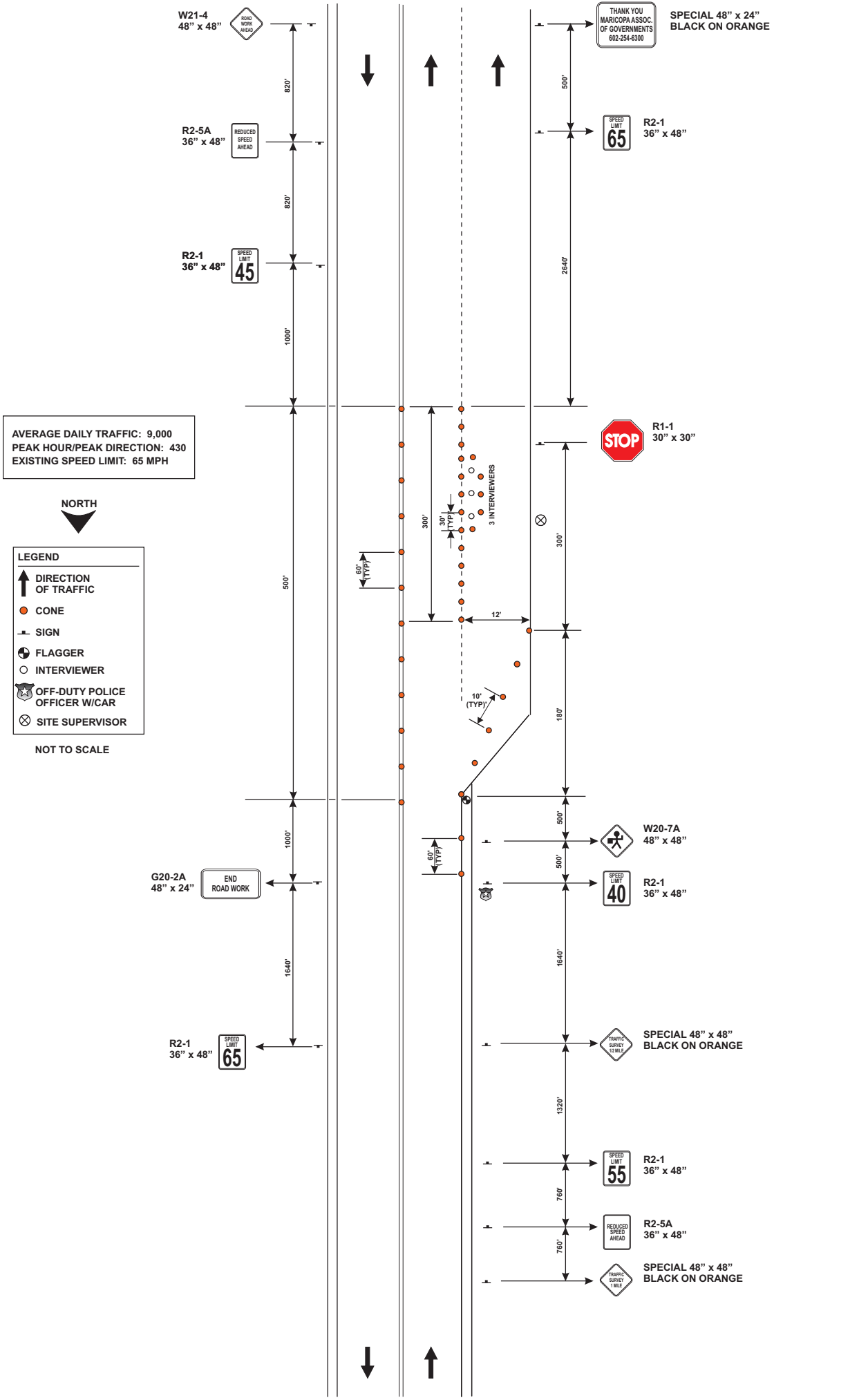
2 Traffic counts only will be taken at these sites.

3 Based on an initial review of the sites, it was discovered that one site originally slated for the external survey, Power Road, 1.5 miles south of Hunt Highway, did not actually exist. Power Road "t's" into Hunt Highway and does not extend to the south. For this reason, the road was dropped from the survey list.

Site #1. S.R. 85 at Patterson Road:

This view is looking south along S.R. 85 at the climbing/passing lane (the climbing/passing lane begins approximately 1.8 miles south of Patterson Road). Utilizing the climbing/passing lane will permit the through lane to remain open during the survey. The location shown is north of Milepost 136 at the start of the passing lane. The survey should occur at the beginning of the passing lane as this will be the least disruptive to traffic flow. The passing lane is approximately 1 mile in length.

This view is looking north at the climbing/passing lane. There is more than adequate sight distance available in both directions. The existing speed limit through this area is 65 miles per hour. Speeds will be reduced in both directions to provide additional safety for survey personnel.

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AUGUST 4, 1999

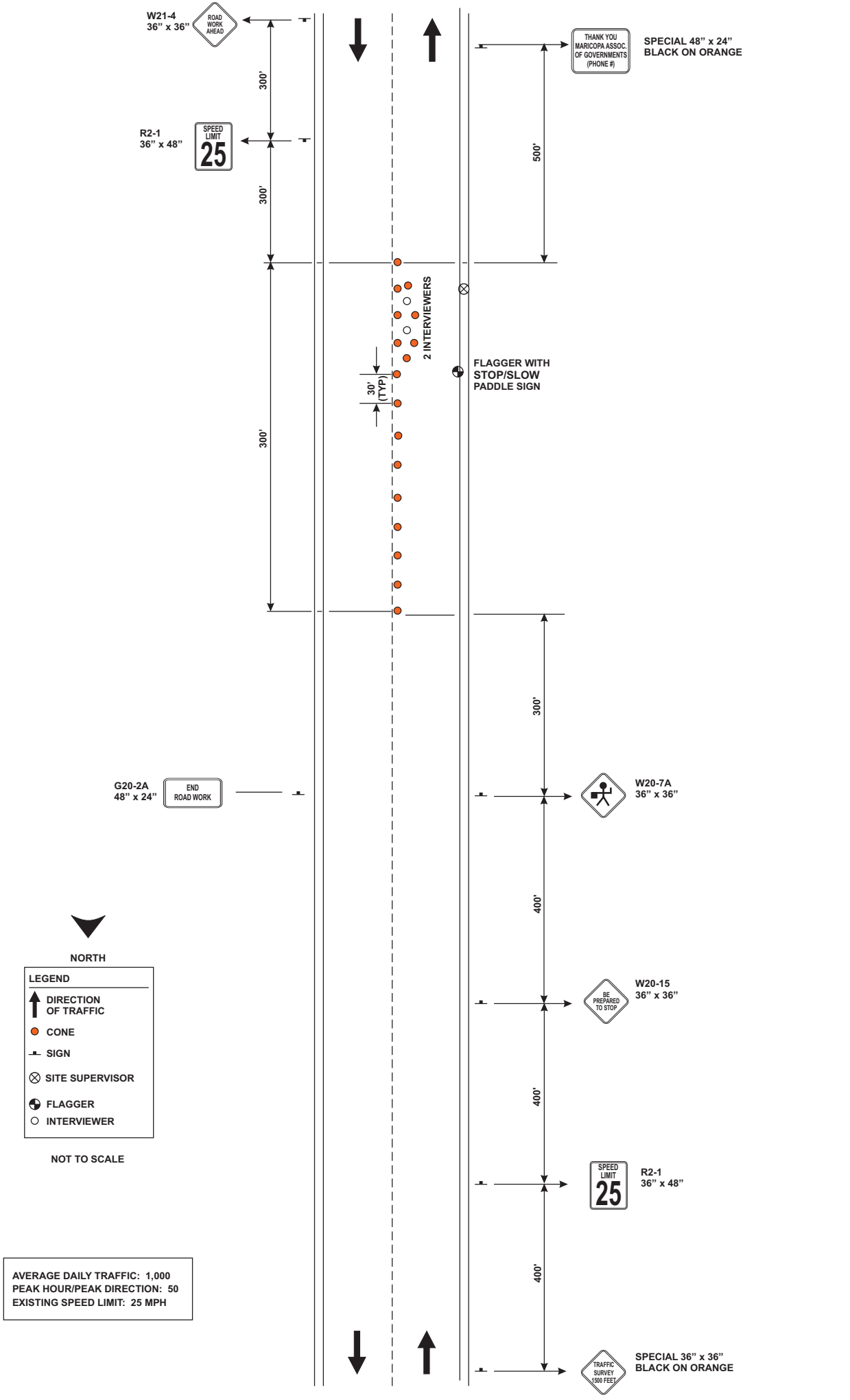
**Traffic Control Plan: Site 1**
**S.R. 85 at Patterson Road**

PARSONS

Site #2. Old U.S. 80 at Gila River

This location is approximately 11.2 miles south of Salome Highway. The location is just south of the large steel bridge over the Gila River. There was very little traffic observed at this location during the site visit. It appears that the sight distance, low existing speeds, and low volumes will permit the surveys to occur in the through lane without

causing significant problems. The sample design indicates that at certain times of the day, all outbound traffic will be surveyed. This finding further justifies stopping traffic in the through lane. The existing speed limit is 25 miles per hour.




**Traffic Control Plan: Site 2**
**Old US 80 at the Gila River**

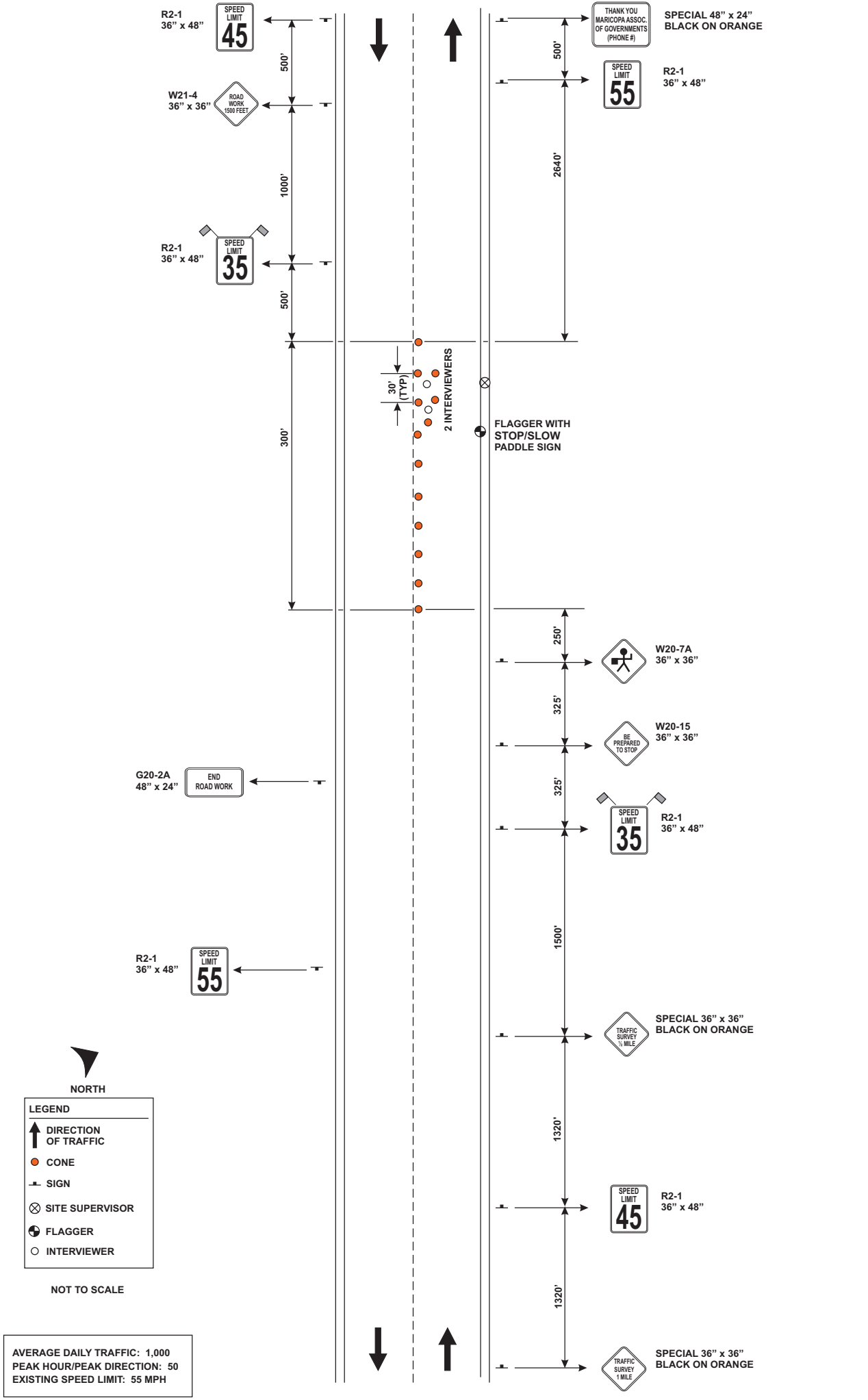
**AUGUST 4, 1999**

PARSONS

Site #3. Salome Highway

This location is approximately 1.1 mile east of Courthouse Road. The existing speed limit is 55 miles per hour. This is a flat, straight section with a wide gravel/dirt shoulder. Observed volumes are low and sight distance is excellent. It is recommended that traffic be stopped in the through lane for the same reasons outlined for the Old U.S. 80 site. However, speeds are somewhat higher at this location and it is recommended that the speed limit be reduced in either direction approaching the survey location.

This view is looking East from the survey area.




**Traffic Control Plan: Site 3**
**Salome Highway East of Courthouse Road**

AUGUST 4, 1999

PARSONS

Site #4. I-10 at 477th Avenue

The best location to survey I-10 vehicles is at the Burnt Wells rest area approximately 7.2 miles west of the Tonopah exit. Although this location was not yet open at the time of the site visit, it should be open by the time of the survey according to ADOT staff. The advantage of using a rest area or freeway ramp to survey vehicles is that it separates survey personnel from through traffic to the greatest extent possible.

END-OF-SURVEY NOTES

1.) PLACE A 65 MPH SPEED LIMIT SIGN 500' BEYOND ENTRANCE RAMP ACCELERATION LANE, BOTH SIDES, UNLESS SUCH SIGNS ALREADY EXIST.

2.) PLACE THE FOLLOWING SIGN 1000' BEYOND THE SPEED LIMIT SIGNS IDENTIFIED IN NOTE1 ON BOTH SIDES OF THE ROADWAY.

THANK YOU
MARICOPA ASSOC.
OF GOVERNMENTS
602-254-6300

VMS NOTES

1.) THE VMS AT LOCATION #1 WILL BE INSTALLED 2 DAYS PRIOR TO THE START OF THE SURVEY. DURING THESE TWO DAYS, THE SIGN WILL ALTERNATE BETWEEN THESE TWO MESSAGES.

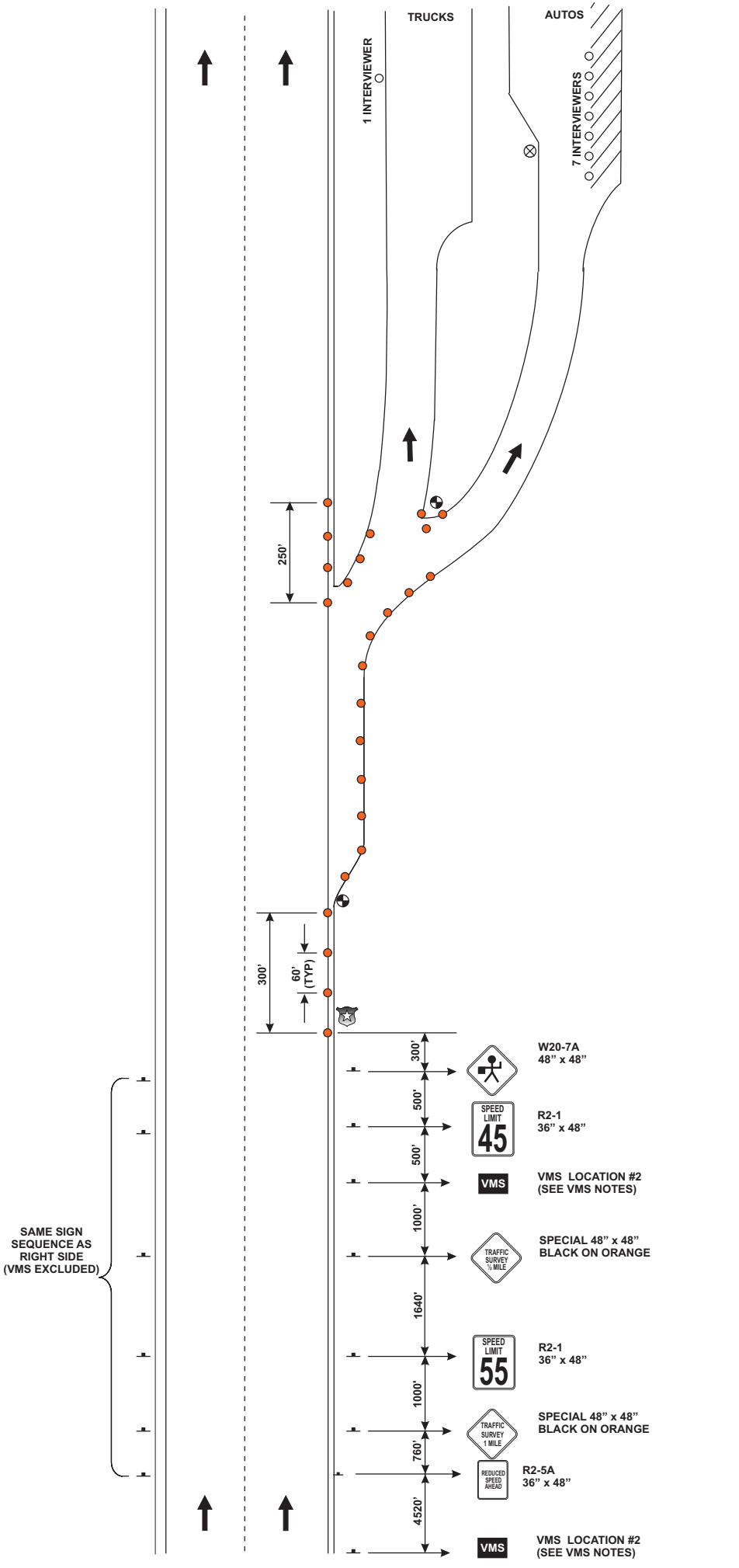
TRAFFIC SURVEY ⟷ (DATE) (TIME)

2.) ON THE SURVEY DAY, THE VMS AT LOCATION #1 WILL ALTERNATE BETWEEN THESE TWO MESSAGES.

PREPARE TO EXIT ⟷ OBEY FLAGGER

3.) THE VMS AT LOCATION #2 WILL BE INSTALLED ON THE SURVEY DAY. THE SIGN WILL ALTERNATE BETWEEN THESE TWO MESSAGES:

TRAFFIC SURVEY ⟷ 2 MILES EXPECT DELAYS




NORTH

LEGEND

- DIRECTION OF TRAFFIC
- CONE
- SIGN
- SITE SUPERVISOR
- FLAGGER
- INTERVIEWER
- OFF-DUTY POLICE OFFICER W/CAR
- VMS — PORTABLE VARIABLE MESSAGE SIGN

NOT TO SCALE

AVERAGE DAILY TRAFFIC: 15,000
PEAK HOUR/PEAK DIRECTION: 720
EXISTING SPEED LIMIT: 65 MPH

**Traffic Control Plan: Site 4**
**I-10 at 477th Avenue**
**Burnt Wells Rest Area 7.2 Miles West of Tonapah**

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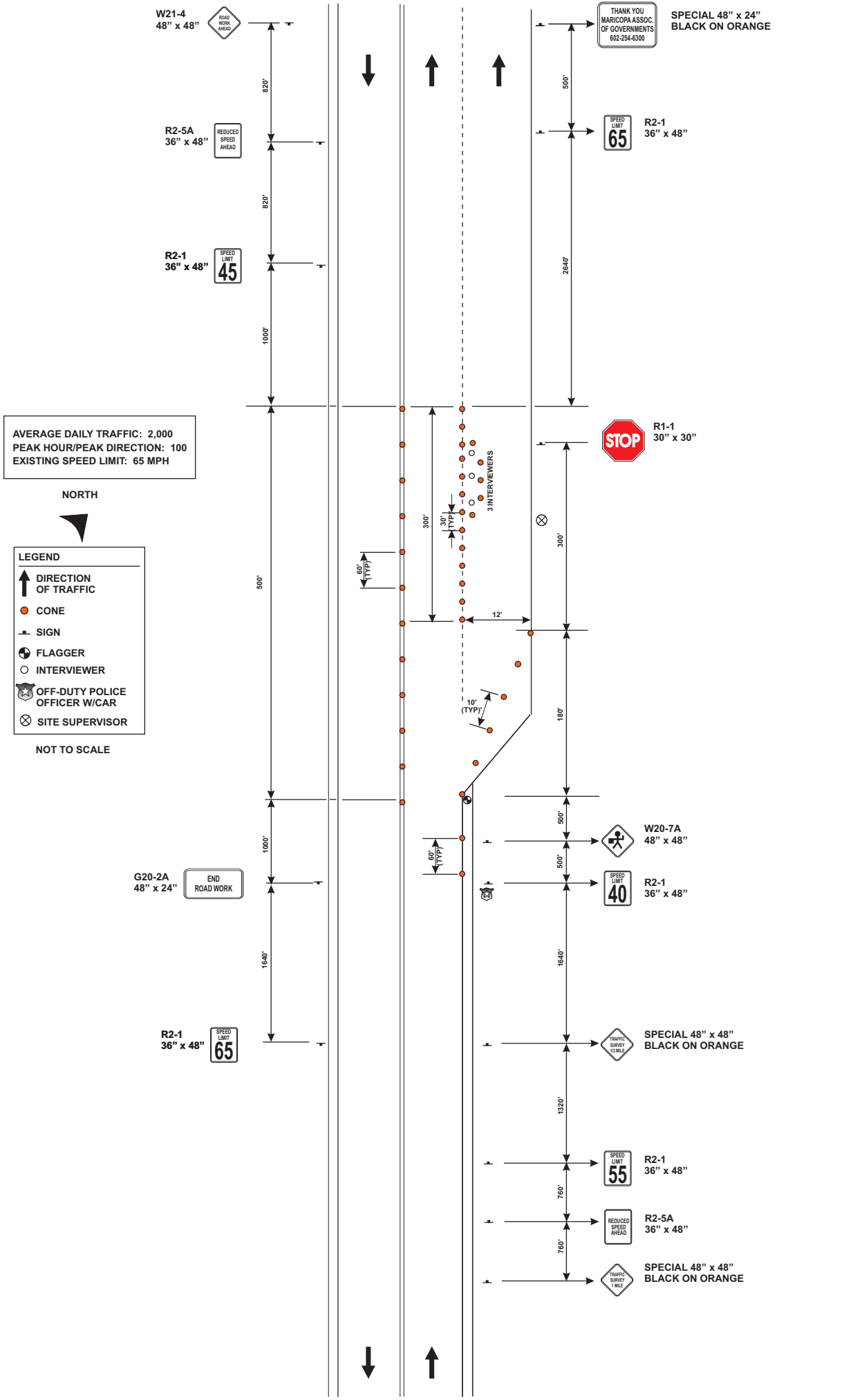
AUGUST 4, 1999

PARSONS

Site #5. U.S. 60 at 355th Avenue

This location is west of the Wickenburg Airport after milepost 104. The photo shows the start of the climbing/passing lane. As with Site #1 (S.R. 85 at Patterson Road), the survey should take place within the auxiliary lane which will allow the through lane to be kept open.

This is a view looking Southeast from the survey location.




Rev. 9/8/99
AUGUST 4, 1999

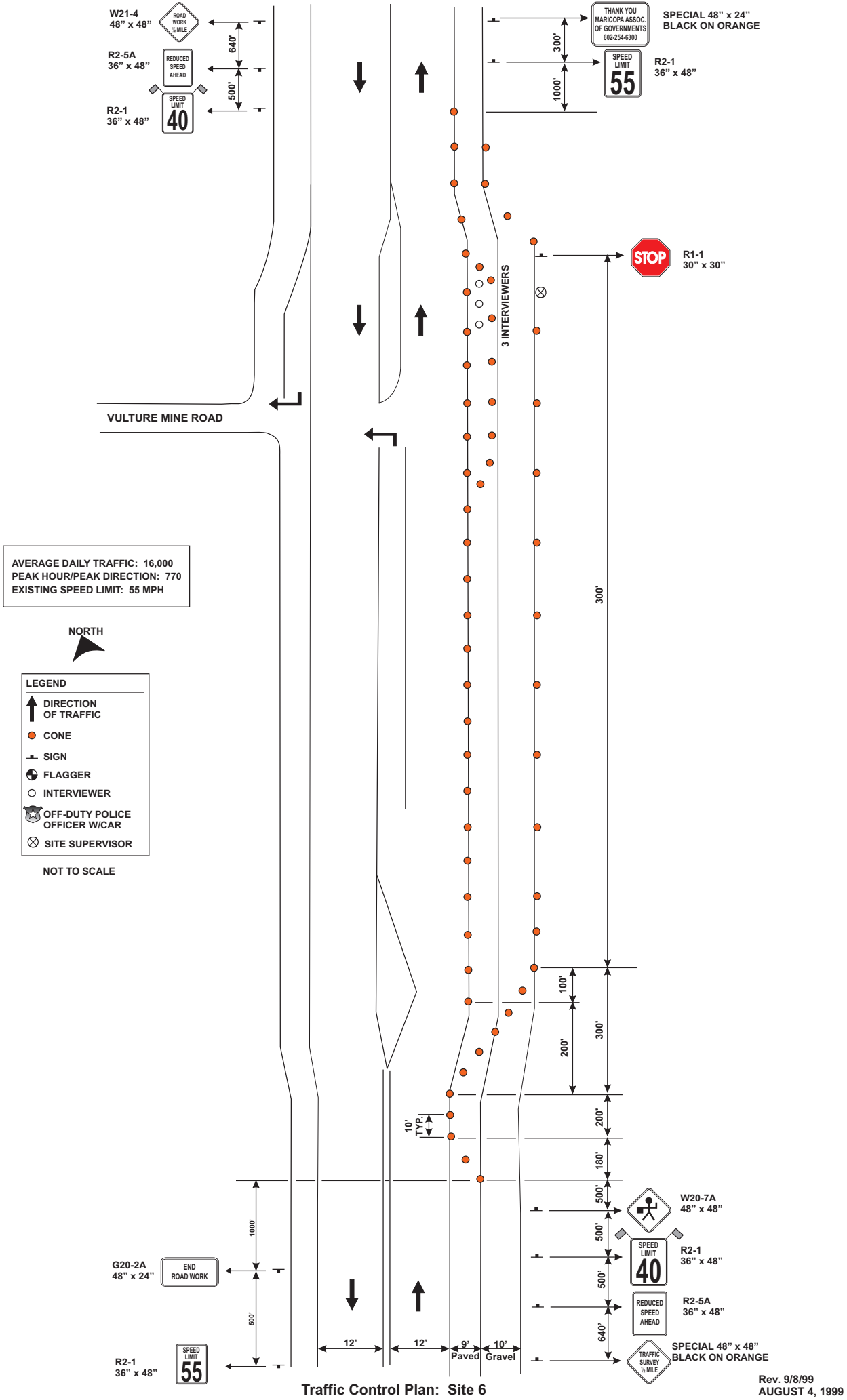
**Traffic Control Plan: Site 5**
**US 60 at 355th Avenue**

PARSONS

Site #6. U.S. 93 at Maricopa/Yavapai County Boundary

This segment of U.S. 93 north of Wickenburg is a two-lane highway with 8 to 9 foot paved shoulders and a 8 foot gravel recovery area. There are rumble strips in the paved shoulder. This photo shows the best location observed during the site visit. In order to conduct the survey at this location, speeds will be reduced, the through lanes narrowed to 11', and the traveled way offset onto the opposite shoulder. The location shown is approximately 500 feet north of Milepost 196. The existing speed limit is 55 miles per hour and sight distance at the location is adequate.

This is a view looking North from the same location.




**Traffic Control Plan: Site 6**
**US 93 near Maricopa/Yavapsi County Boundary**
**(North of Wickenburg approximately Mile Post 196.8)**

Rev. 9/8/99
AUGUST 4, 1999

PARSONS

Site #7. I-17 at the Maricopa/Yavapai County Boundary

This is a view of the off-ramp from I-17 to Table Mesa Road (Exit 236). Background volumes are lower at this location than other area interchanges and the ramp is relatively long. There is guardrail on one side of the ramp. It is easy for vehicles to get back onto I-17 from this location (Table Mesa is a diamond interchange). Exit 242 was also reviewed as a viable survey site. However, background volumes appeared substantially higher and the ramp has guardrail along both sides. These factors removed this site from further consideration.

END-OF-SURVEY NOTES

1.) PLACE A 65 MPH SPEED LIMIT SIGN 500' BEYOND ENTRANCE RAMP ACCELERATION LANE, BOTH SIDES, UNLESS SUCH SIGNS ALREADY EXIST.

2.) PLACE THE FOLLOWING SIGN 1000' BEYOND THE SPEED LIMIT SIGNS IDENTIFIED IN NOTE1 ON BOTH SIDES OF THE ROADWAY.

THANK YOU
MARICOPA ASSOC.
OF GOVERNMENTS
602-254-6300

VMS NOTES

1.) THE VMS AT LOCATION #1 WILL BE INSTALLED 2 DAYS PRIOR TO THE START OF THE SURVEY. DURING THESE TWO DAYS, THE SIGN WILL ALTERNATE BETWEEN THESE TWO MESSAGES.

TRAFFIC SURVEY ⟷ (DATE) (TIME)

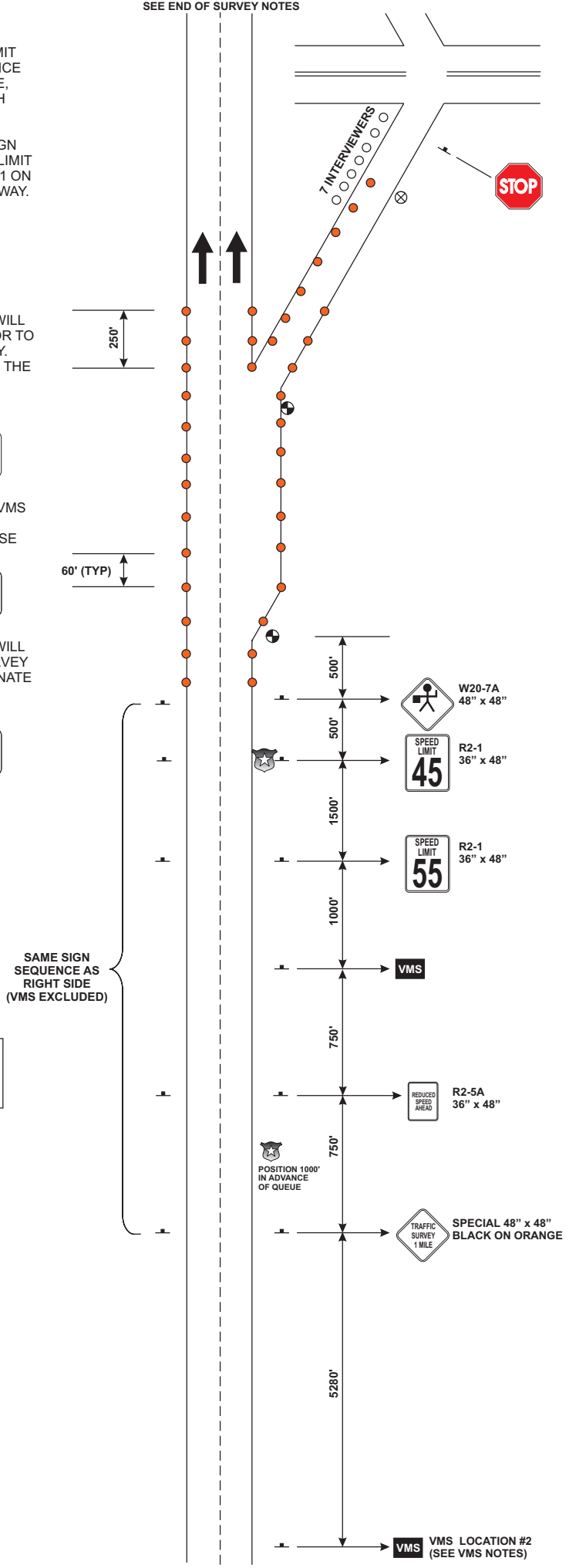
2.) ON THE SURVEY DAY, THE VMS AT LOCATION #1 WILL ALTERNATE BETWEEN THESE TWO MESSAGES.

PREPARE TO EXIT ⟷ OBEY FLAGGER

3.) THE VMS AT LOCATION #2 WILL BE INSTALLED ON THE SURVEY DAY. THE SIGN WILL ALTERNATE BETWEEN THESE TWO MESSAGES.

TRAFFIC SURVEY ⟷ 2 MILES EXPECT DELAYS

AVERAGE DAILY TRAFFIC: 30,000
PEAK HOUR/PEAK DIRECTION: 1,440
EXISTING SPEED LIMIT: 65 MPH




NORTH

LEGEND
- DIRECTION OF TRAFFIC
- CONE
- SIGN
- SITE SUPERVISOR
- FLAGGER
- INTERVIEWER
- OFF-DUTY POLICE OFFICER W/CAR
- VMS PORTABLE VARIABLE MESSAGE SIGN

NOT TO SCALE

**Traffic Control Plan: Site 7**
**I-17 at the Maricopa/Yavapai County Boundary**
**Table Mesa Road (Exit 236)**

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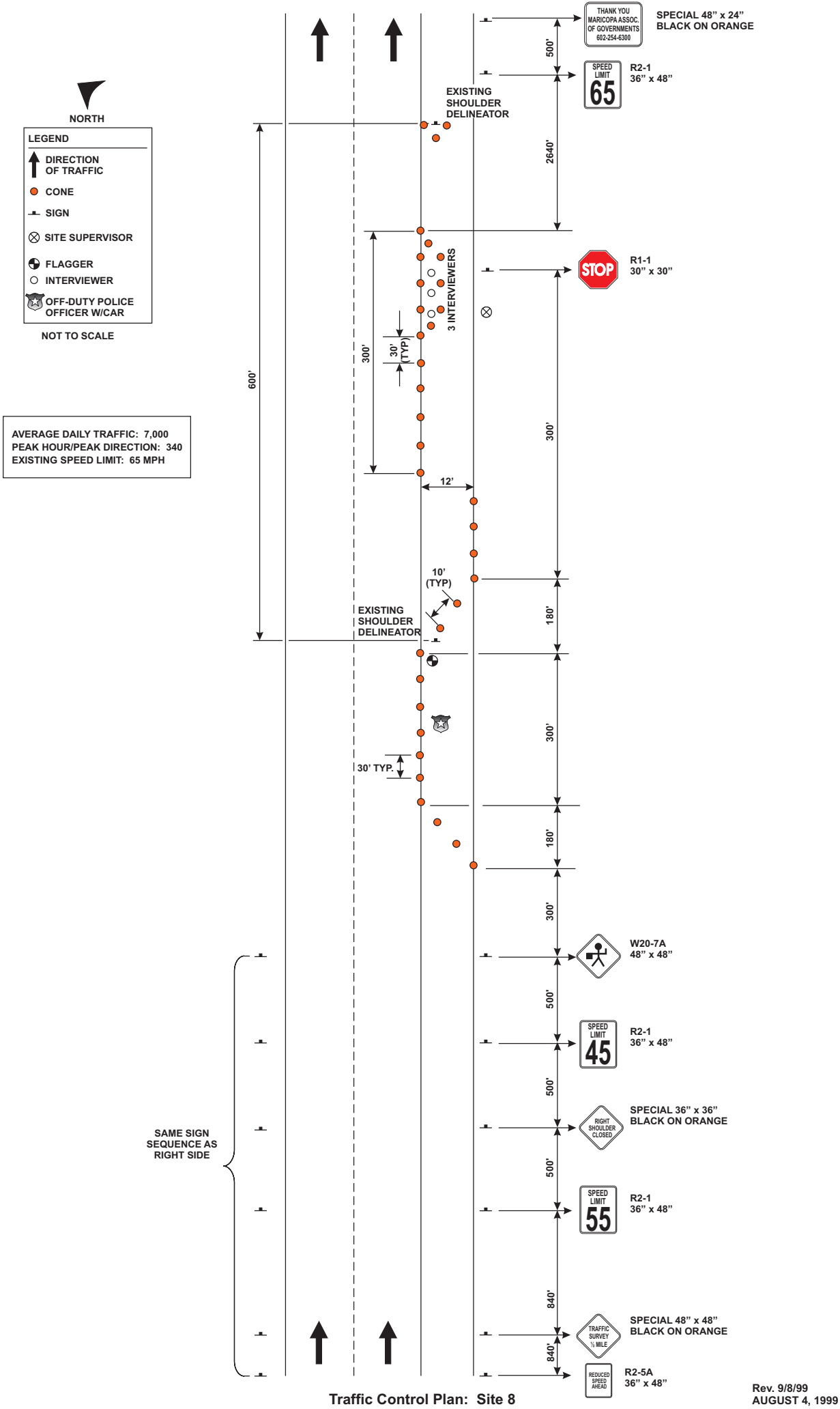
PARSONS

Site #8. S.R. 87/Beeline Highway

This location along S.R. 87 is approximately 3 miles east of Bush Highway. S.R. 87 is a rural, divided highway through this area. Between Milepost 202 and 203 there is a gravel pull-out/shoulder area that is approximately 640 feet long. The survey area is defined by two shoulder delineator posts (the delineator at the start of the survey location in shown in the above photo. The existing speed limit is 65 miles per hour.

This photo was taken looking West from the survey location.




**Traffic Control Plan: Site 8**
**S.R. 87 Beeline Highway**
**3 Miles East of Bush Highway (between MP 202 and 203)**

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AUGUST 4, 1999

PARSONS

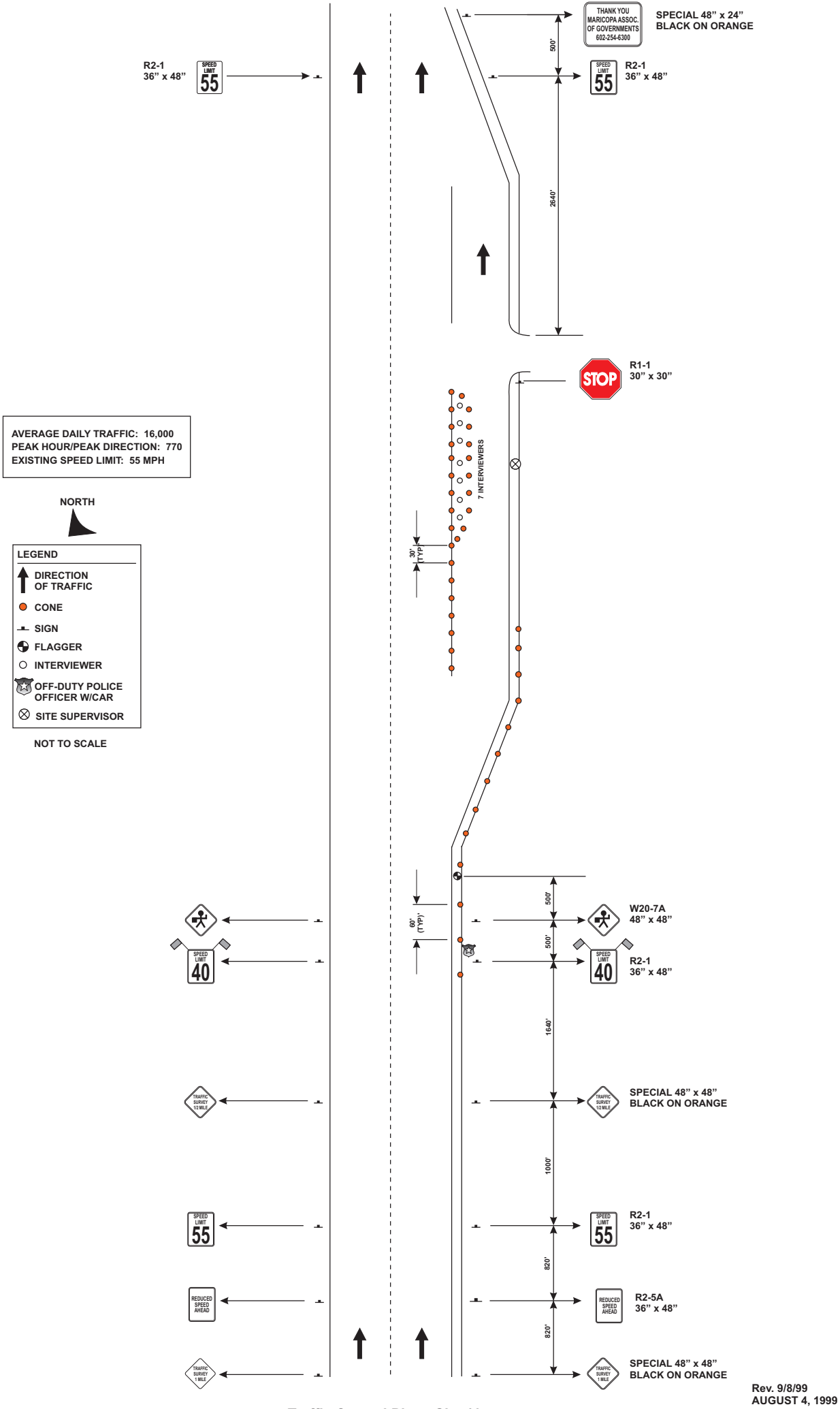
Site #9. S.R. 88 South of Water Road (count only)

This is a count-only location. It would not be possible to conduct a survey along this route because of a lack of adequate sight distance. A reasonable location for the count equipment is approximately 200 feet north of Mountain View Road (shown in the above photo). The count equipment could be secured to a wood utility pole. The speed limit through this area is 50 miles per hour.

Site #10. U.S. 60 Southeast of Goldfield Road

This location is on U.S. 60 east of where it changes from a freeway to a divided, rural highway. It appeared during the site visit that closing a through lane would cause delays as a result of heavy traffic volumes. The photo shows a very long right-turn lane leading to Canyon Vistas RV resort. There is a wide shoulder here as well and an acceleration lane on the other side of the intersection. The survey should take place in the right-turn lane/shoulder area. The RV resort appears to have recently been opened and there little background traffic was observed.

This is a view looking West of the intersection.




Rev. 9/8/99
AUGUST 4, 1999

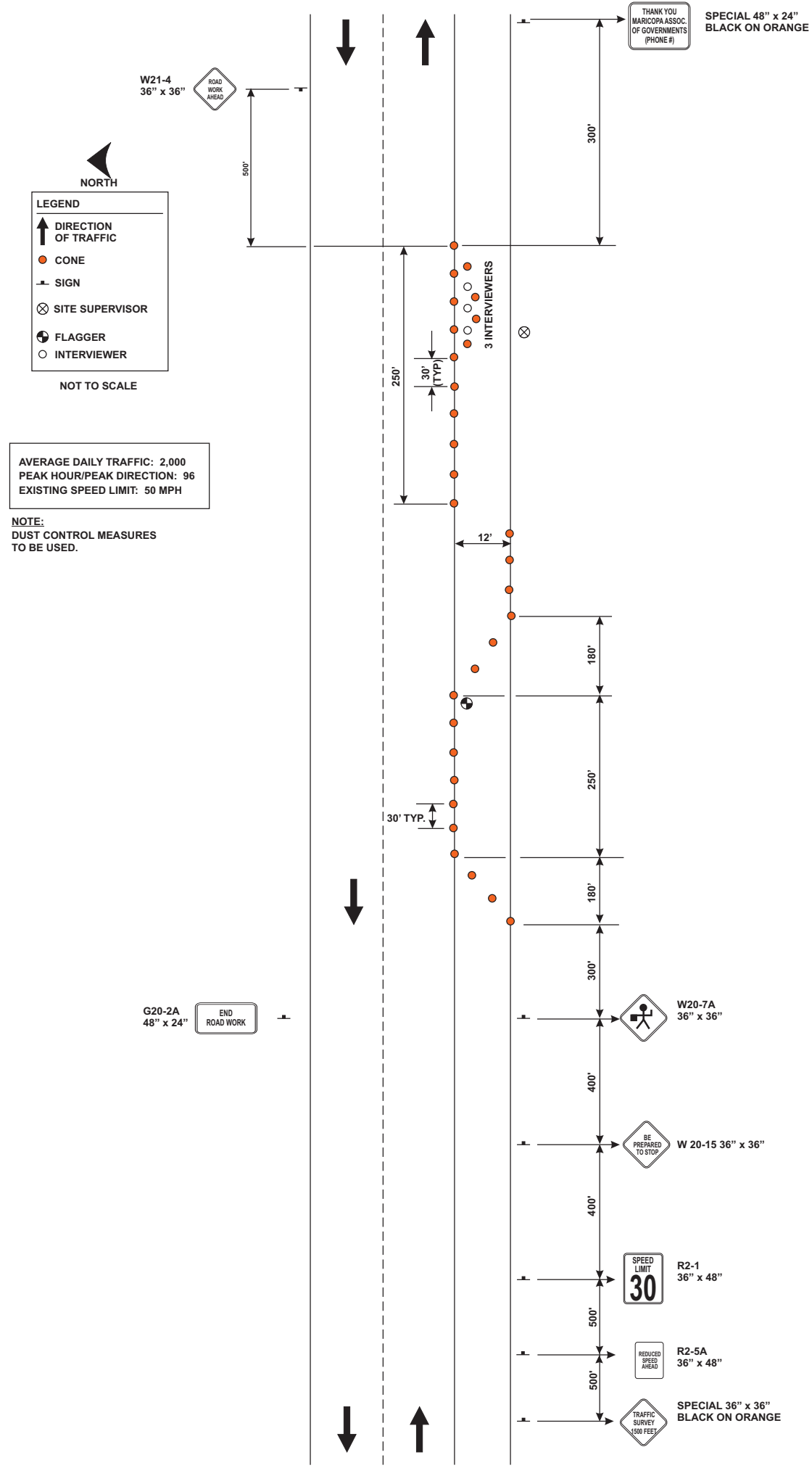
**Traffic Control Plan: Site 10**
**US 60 about 3 Miles S/E of Goldfield Road**

PARSONS

Site #11. Ocotillo Road east of Meridian Road

It will be relatively easy to survey drivers at this location because of the good sight distance and wide shoulder area. The location identified is approximately ½ mile east of Signal Butte. The speed limit is 50 miles per hour.

This is a view looking North.




Rev. 9/16/99
AUGUST 4, 1999

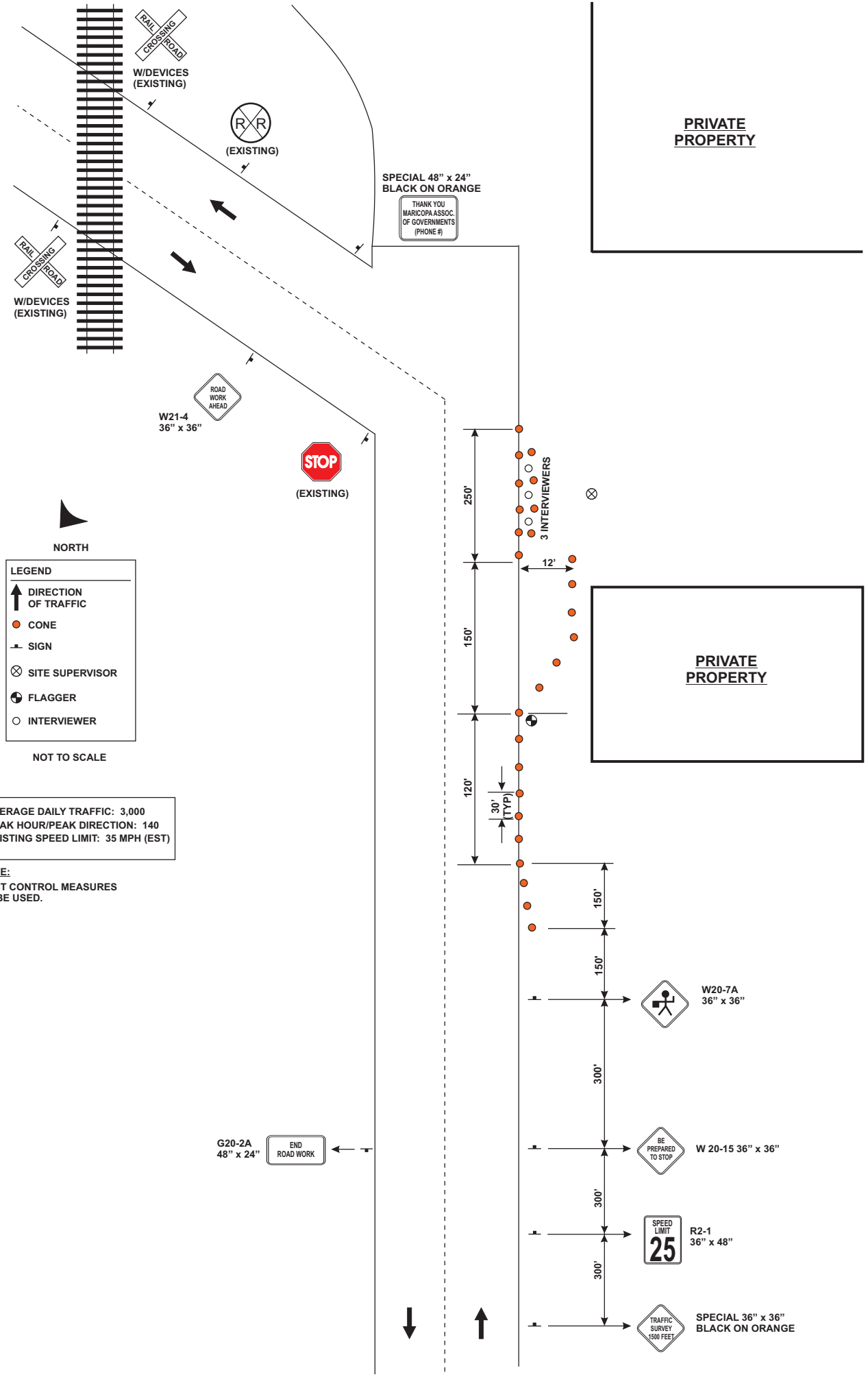
**Traffic Control Plan: Site 11**
**Ocotillo Road ½ Mile East of Signal Butte**

PARSONS

Site #12. Rittenhouse Road

This location is where Rittenhouse crosses the R.R. tracks near the Maricopa County Boundary (the county sign is located on the other side of the tracks). Because of the curve, speeds in this area are naturally low and vehicles traveling across the tracks to travel north currently stop. There is a large unpaved shoulder that will be used in conducting the survey.

This is another view of the location.




Rev. 9/16/99
AUGUST 4, 1999

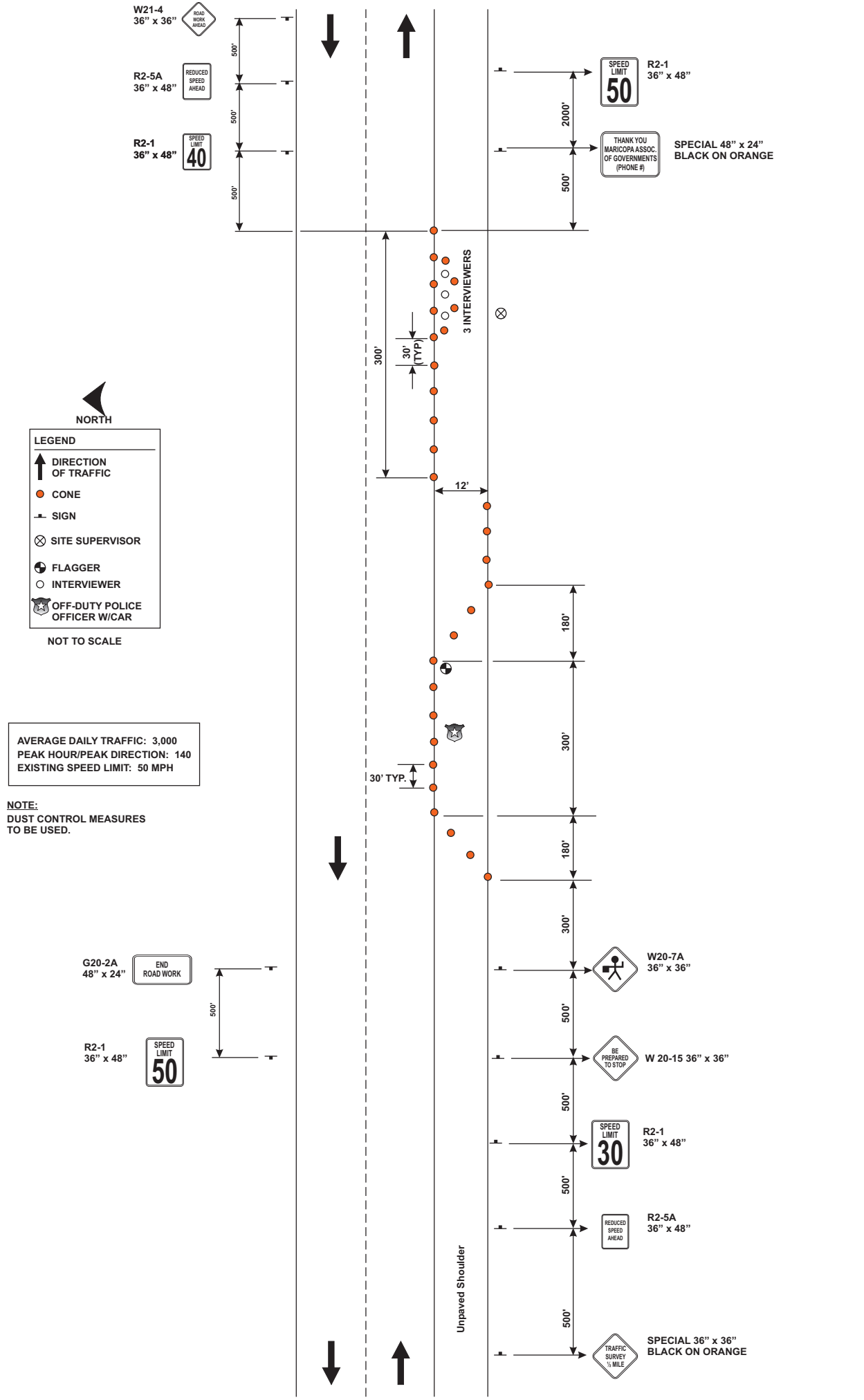
**Traffic Control Plan: Site 12**
**Rittenhouse Road South of Hunt Highway**

PARSONS

Site #13. Hunt Highway east of Ellsworth Road

This location along Hunt Highway is approximately 1.7 miles east of Ellsworth Road. At this location, the survey will occur in the wide, unpaved shoulder area. This is a view facing south. The speed limit along this section is 50 miles per hour.

This is a view looking Northbound.




Rev. 9/16/99
AUGUST 4, 1999

**Traffic Control Plan: Site 13**
**Hunt Highway 1.7 Miles East of Ellsworth Road**

PARSONS

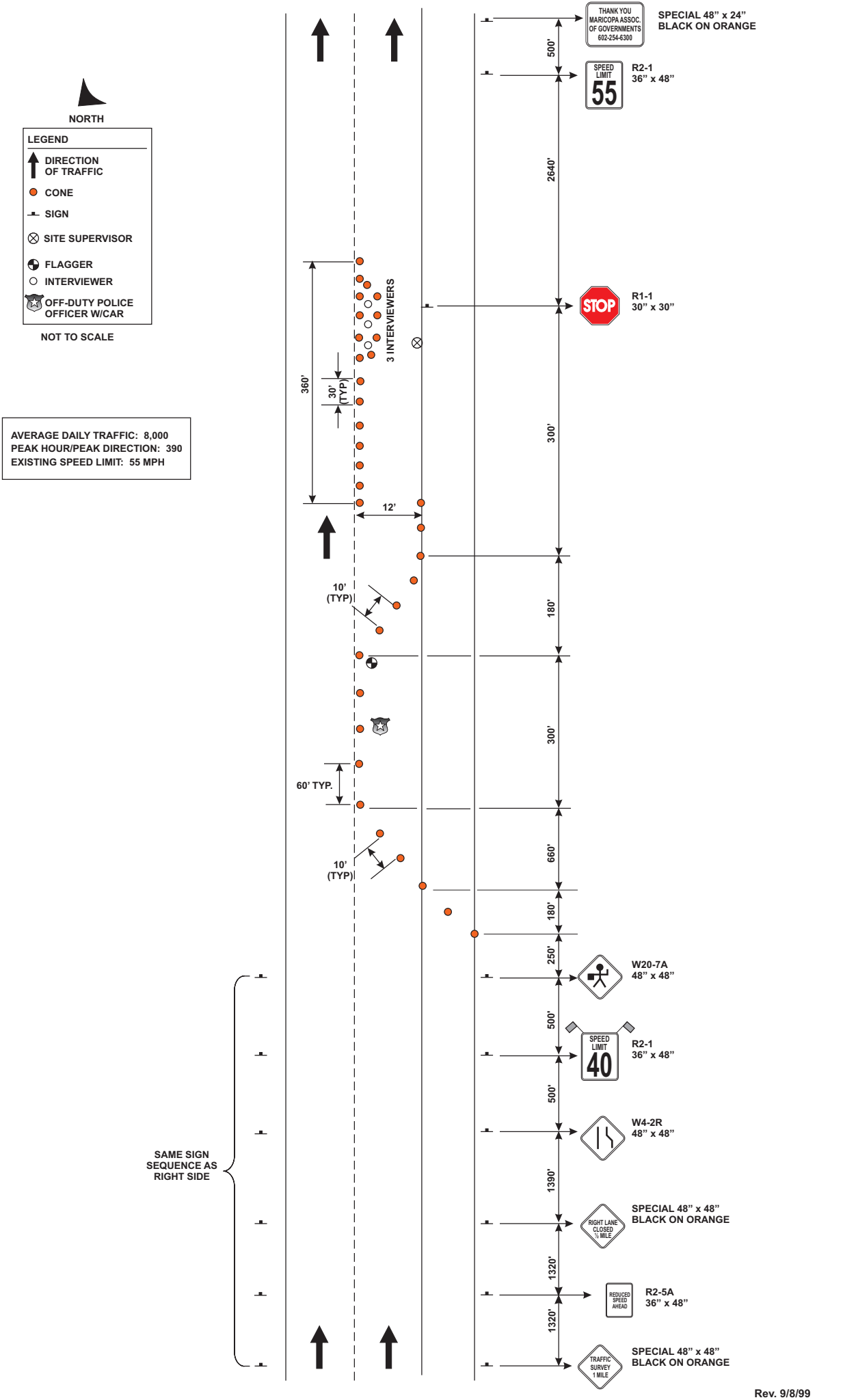
Site #14. Gilbert Road (count only)

This location is along Gilbert Road approximately 1000 feet south of Riggs Road. Count equipment could be placed anywhere along this stretch and secured to a wood utility pole.

This is a view of the other direction.

Site #15. S.R. 87 near the junction of S.R. 87/587

This location is approximately ½ mile south of Riggs Road. Observed volumes are relatively low for a four-lane divided highway, and it is recommended that a lane be closed to allow the survey to occur. The location shown is at Milepost 160. This location is far enough from the nearest intersection to provide enough taper length to close a lane. To eliminate the possibility of double counting with I-10 at this location, an additional question be included in the questionnaire.

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AUGUST 4, 1999

**Traffic Control Plan: Site 15**
**S.R. 87 Near the Junction of S.R. 87/587**

PARSONS

Site #16. I-10 South of Hunt Highway


The best location for I-10 south is at the rest area approximately 5.8 miles past S.R. 587 (Casa Blanca). As with Site #4 (I-10 at 477th Avenue) the survey of autos could take place in a parking stall. Both I-10 rest area sites will require two flaggers, one at the end of the I-10 ramp, the other to direct traffic at the auto/truck split shown in the above picture. A separate surveyor will be needed to survey tractor-trailer trucks on their site of the rest area.

This is a view of the auto side of rest area.

END-OF-SURVEY NOTES

1.) PLACE A 65 MPH SPEED LIMIT SIGN 500' BEYOND ENTRANCE RAMP ACCELERATION LANE, BOTH SIDES, UNLESS SUCH SIGNS ALREADY EXIST.

2.) PLACE THE FOLLOWING SIGN 1000' BEYOND THE SPEED LIMIT SIGNS IDENTIFIED IN NOTE1 ON BOTH SIDES OF THE ROADWAY.


VMS NOTES

1.) THE VMS AT LOCATION #1 WILL BE INSTALLED 2 DAYS PRIOR TO THE START OF THE SURVEY. DURING THESE TWO DAYS, THE SIGN WILL ALTERNATE BETWEEN THESE TWO MESSAGES:


2.) ON THE SURVEY DAY, THE VMS AT LOCATION #1 WILL ALTERNATE BETWEEN THESE TWO MESSAGES:


3.) THE VMS AT LOCATION #2 WILL BE INSTALLED ON THE SURVEY DAY. THE SIGN WILL ALTERNATE BETWEEN THESE TWO MESSAGES:

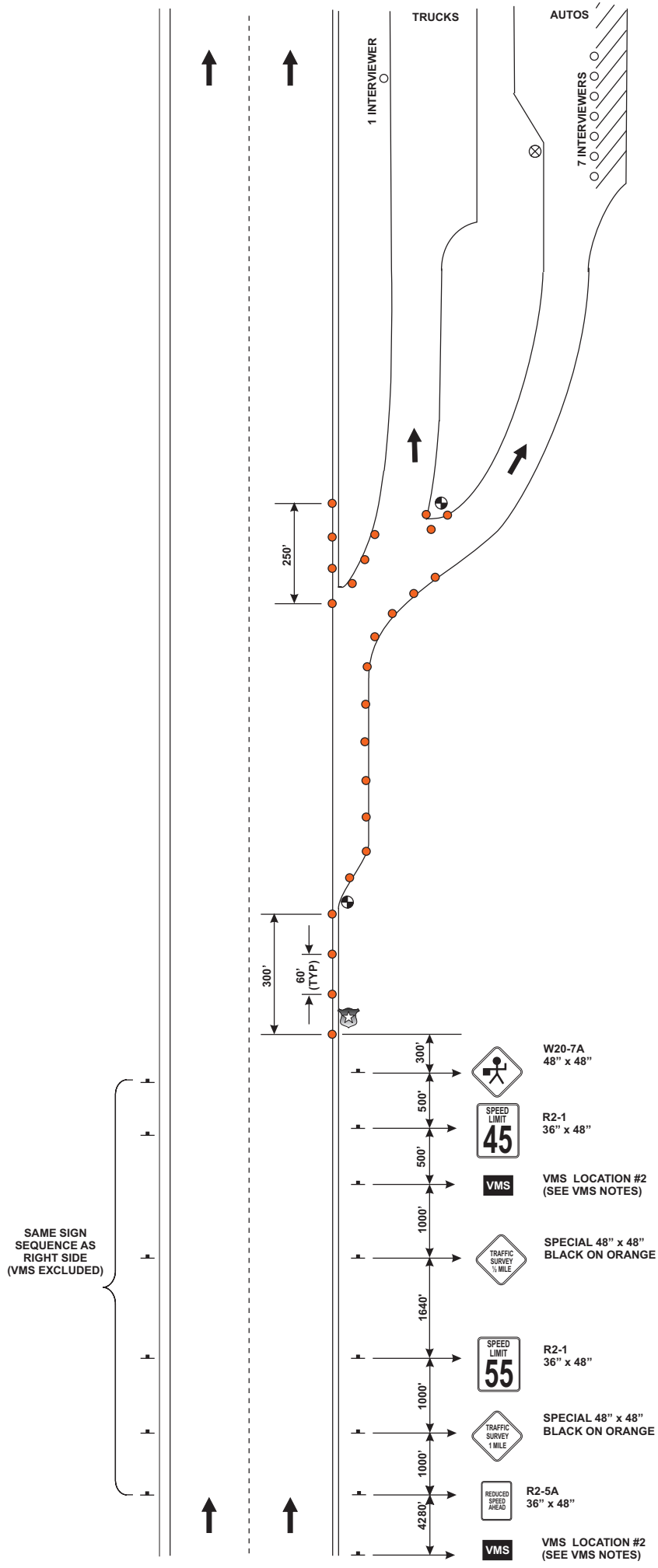

NORTH

LEGEND

- DIRECTION OF TRAFFIC
- CONE
- SIGN
- SITE SUPERVISOR
- FLAGGER
- INTERVIEWER
- OFF-DUTY POLICE OFFICER W/CAR
- VMS — PORTABLE VARIABLE MESSAGE SIGN

NOT TO SCALE

AVERAGE DAILY TRAFFIC: 37,000
PEAK HOUR/PEAK DIRECTION: 1,780
EXISTING SPEED LIMIT: 65 MPH




**Traffic Control Plan: Site 16**
**I-10 South of Hunt Highway**
**Rest Area 5.8 Miles South of Casa Blanca**

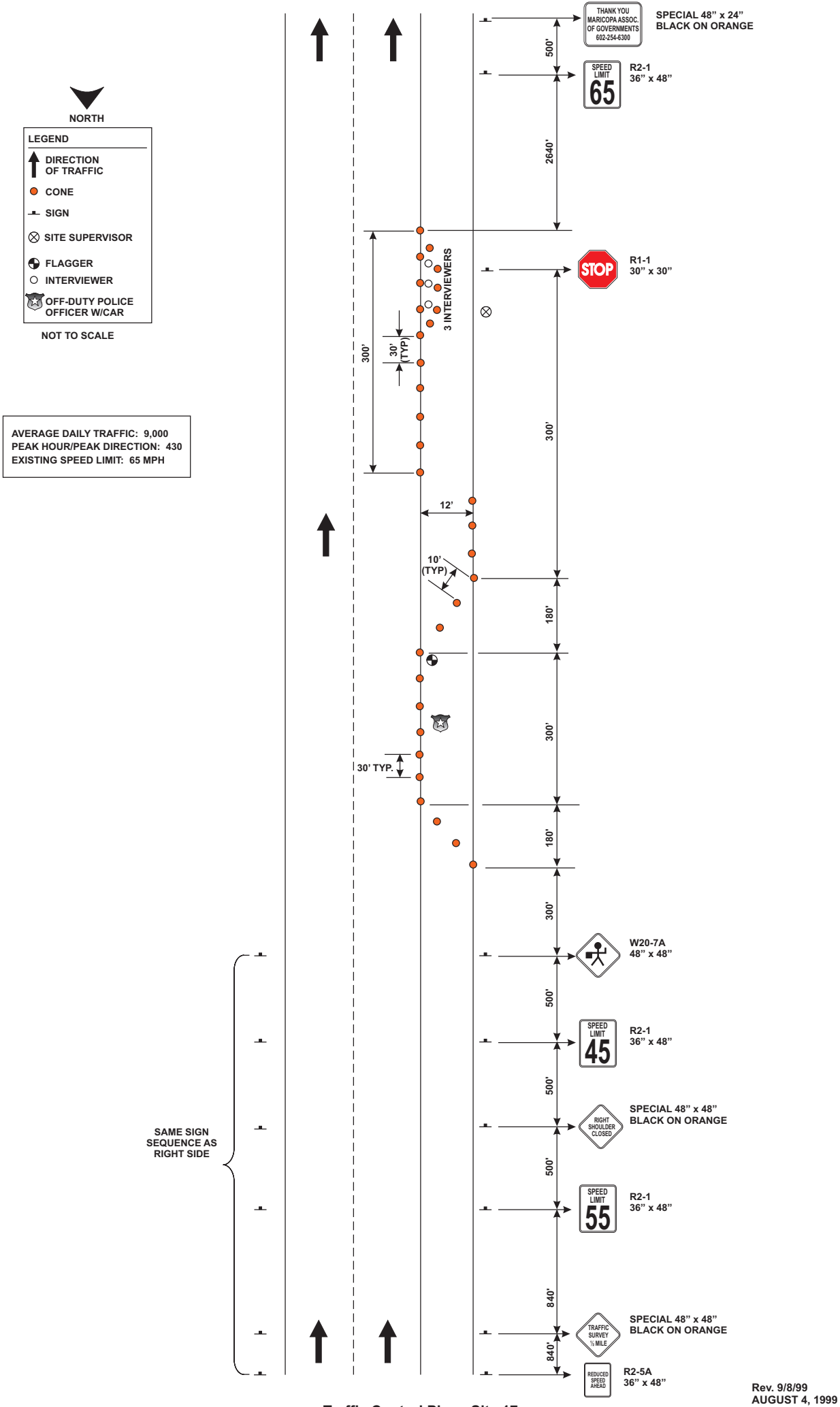
Rev. 9/8/99
AUGUST 4, 1999

PARSONS

Site #17. S.R. 347/Maricopa Road south of Hunt Highway

This location is just north of the Pinal County sign. The survey will occur in the wide shoulder area. There is available parking nearby (the survey crew would carpool).

This is a view looking North from the survey area.




**Traffic Control Plan: Site 17**
**S.R. 347/Maricopa Road South of Hunt Highway**

Rev. 9/8/99
AUGUST 4, 1999

PARSONS

## Appendix C – Traffic and Classification Count Data

**Site 1**
**Site Location: SR 85 at Patterson Road**
**Survey Date: Thursday, September 30, 1999**

| | Actual Volume (Direction of Survey-SB) | | | | Surveyed Trips (Direction of Survey-SB) | | | | Percentage of Volume Sampled (Direction of Survey-SB) | | | | Confidence Interval [4] (Direction of Survey-SB) | | | | Actual Volume (NB Direction) | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Time of Day | Light [1] | Medium [2] | Heavy [3] | Total | Light [1] | Medium [2] | Heavy [3] | Total | Light [1] | Medium [2] | Heavy [3] | Total | Light [1] | Medium [2] | Heavy [3] | Total | Light [1] | Medium [2] | Heavy [3] | Total |
| 0:00-0:59 | 16 | 1 | 25 | 42 | No Surveys Taken | | | | Not Applicable | | | | Not Applicable | | | | 16 | 0 | 18 | 34 |
| 1:00-1:59 | 7 | 2 | 18 | 27 | No Surveys Taken | | | | Not Applicable | | | | Not Applicable | | | | 10 | 1 | 10 | 21 |
| 2:00-2:59 | 14 | 0 | 27 | 41 | No Surveys Taken | | | | Not Applicable | | | | Not Applicable | | | | 4 | 1 | 10 | 15 |
| 3:00-3:59 | 11 | 0 | 19 | 30 | No Surveys Taken | | | | Not Applicable | | | | Not Applicable | | | | 13 | 0 | 19 | 32 |
| 4:00-4:59 | 17 | 1 | 36 | 54 | No Surveys Taken | | | | Not Applicable | | | | Not Applicable | | | | 17 | 3 | 12 | 32 |
| 5:00-5:59 | 62 | 7 | 36 | 105 | No Surveys Taken | | | | Not Applicable | | | | Not Applicable | | | | 46 | 2 | 16 | 64 |
| 6:00-6:59 | 113 | 10 | 30 | 153 | 0 | 0 | 0 | 0 | 0.0% | 0.0% | 0.0% | 0.0% | n/a | n/a | n/a | n/a | 67 | 2 | 26 | 95 |
| 7:00-7:59 | 87 | 9 | 35 | 131 | 23 | 3 | 2 | 28 | 26.4% | 33.3% | 5.7% | 21.4% | 0.18 | 0.49 | 0.68 | 0.16 | 89 | 3 | 27 | 119 |
| 8:00-8:59 | 121 | 8 | 42 | 171 | 28 | 3 | 0 | 31 | 23.1% | 37.5% | 0.0% | 18.1% | 0.16 | 0.48 | n/a | 0.16 | 106 | 0 | 34 | 140 |
| 9:00-9:59 | 119 | 9 | 53 | 181 | 33 | 5 | 3 | 41 | 27.7% | 55.6% | 5.7% | 22.7% | 0.15 | 0.31 | 0.55 | 0.13 | 105 | 5 | 44 | 154 |
| 10:00-10:59 | 137 | 10 | 45 | 192 | 46 | 3 | 2 | 51 | 33.6% | 30.0% | 4.4% | 26.6% | 0.12 | 0.50 | 0.69 | 0.12 | 110 | 3 | 30 | 143 |
| 11:00-11:59 | 110 | 3 | 48 | 161 | 36 | 3 | 1 | 40 | 32.7% | 100.0% | 2.1% | 24.8% | 0.13 | 0.00 | 0.98 | 0.13 | 119 | 5 | 40 | 164 |
| 12:00-12:59 | 128 | 5 | 46 | 179 | 34 | 5 | 6 | 45 | 26.6% | 100.0% | 13.0% | 25.1% | 0.14 | 0.00 | 0.38 | 0.13 | 159 | 2 | 31 | 192 |
| 13:00-13:59 | 134 | 6 | 42 | 182 | 38 | 6 | 1 | 45 | 28.4% | 100.0% | 2.4% | 24.7% | 0.14 | 0.00 | 0.98 | 0.13 | 137 | 4 | 44 | 185 |
| 14:00-14:59 | 156 | 4 | 46 | 206 | 36 | 1 | 5 | 42 | 23.1% | 25.0% | 10.9% | 20.4% | 0.14 | 0.98 | 0.42 | 0.14 | 139 | 3 | 41 | 183 |
| 15:00-15:59 | 166 | 7 | 47 | 220 | 33 | 2 | 2 | 37 | 19.9% | 28.6% | 4.3% | 16.8% | 0.15 | 0.63 | 0.69 | 0.15 | 170 | 13 | 37 | 220 |
| 16:00-16:59 | 179 | 6 | 51 | 236 | 41 | 1 | 0 | 42 | 22.9% | 16.7% | 0.0% | 17.8% | 0.13 | 0.98 | n/a | 0.14 | 149 | 5 | 31 | 185 |
| 17:00-17:59 | 166 | 2 | 38 | 206 | 1 | 0 | 0 | 1 | 0.6% | 0.0% | 0.0% | 0.5% | 0.98 | n/a | n/a | 0.98 | 118 | 3 | 52 | 173 |
| 18:00-18:59 | 114 | 4 | 42 | 160 | No Surveys Taken | | | | Not Applicable | | | | Not Applicable | | | | 97 | 5 | 41 | 143 |
| 19:00-19:59 | 82 | 4 | 43 | 129 | No Surveys Taken | | | | Not Applicable | | | | Not Applicable | | | | 68 | 0 | 42 | 110 |
| 20:00-20:59 | 59 | 2 | 25 | 86 | No Surveys Taken | | | | Not Applicable | | | | Not Applicable | | | | 64 | 0 | 30 | 94 |
| 21:00-21:59 | 60 | 3 | 20 | 83 | No Surveys Taken | | | | Not Applicable | | | | Not Applicable | | | | 59 | 8 | 26 | 93 |
| 22:00-22:59 | 34 | 1 | 27 | 62 | No Surveys Taken | | | | Not Applicable | | | | Not Applicable | | | | 37 | 1 | 28 | 66 |
| 23:00-23:59 | 27 | 4 | 23 | 54 | No Surveys Taken | | | | Not Applicable | | | | Not Applicable | | | | 37 | 4 | 28 | 69 |
| **TOTALS** | 2119 | 108 | 864 | **3091** | 349 | 32 | 22 | **403** | 16.5% | 29.6% | 2.5% | **13.0%** | 0.05 | 0.15 | 0.21 | 0.05 | 1936 | 73 | 717 | **2726** |
| Percentages | 68.6% | 3.5% | 28.0% | 100.0% | 90.0% | 10.0% | 10.0% | 100.0% | | | | | | | | | 71.0% | 2.7% | 26.3% | 100.0% |
| **Proportion of Daily Traffic During Survey Period** | | | | | | | | | | | | | | | | | | | | |
| Volume | 1616 | 79 | 523 | **2218** | | | | | | | | | | | | | 1468 | 48 | 437 | **1953** |
| Percentages | 76.3% | 73.1% | 60.5% | 71.8% | | | | | | | | | | | | | 75.8% | 65.8% | 60.9% | 71.6% |

[1] This includes Motorcycles, Cars & Trailers, plus 2 Axles long

[2] This includes Buses and Trucks with 2 thru 4 Axles

[3] This includes double or multi trailer trucks

[4] Confidence interval at 95% confidence level of a proporation of 0.50.

[5] Surveyed vehicles more than counted vehicles for this time period.

**Site 2**
**Site Location: Old U.S. 80 at Gila River**
**Survey Date: Tuesday, September 14, 1999**

| | Actual Volume (Direction of Survey-SB) | | | | Surveyed Trips (Direction of Survey-SB) | | | | Percentage of Volume Sampled (Direction of Survey-SB) | | | | Confidence Interval [4] (Direction of Survey-SB) | | | | Actual Volume (NB Direction) | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Time of Day | Light [1] | Medium [2] | Heavy [3] | Total | Light [1] | Medium [2] | Heavy [3] | Total | Light [1] | Medium [2] | Heavy [3] | Total | Light [1] | Medium [2] | Heavy [3] | Total | Light [1] | Medium [2] | Heavy [3] | Total |
| 0:00-0:59 | 1 | 0 | 0 | 1 | No Surveys Taken | | | | Not Applicable | | | | Not Applicable | | | | 0 | 0 | 0 | 0 |
| 1:00-1:59 | 3 | 0 | 0 | 3 | No Surveys Taken | | | | Not Applicable | | | | Not Applicable | | | | 0 | 0 | 0 | 0 |
| 2:00-2:59 | 0 | 0 | 0 | 0 | No Surveys Taken | | | | Not Applicable | | | | Not Applicable | | | | 0 | 0 | 0 | 0 |
| 3:00-3:59 | 1 | 0 | 0 | 1 | No Surveys Taken | | | | Not Applicable | | | | Not Applicable | | | | 1 | 0 | 0 | 1 |
| 4:00-4:59 | 0 | 0 | 0 | 0 | No Surveys Taken | | | | Not Applicable | | | | Not Applicable | | | | 0 | 0 | 0 | 0 |
| 5:00-5:59 | 14 | 0 | 0 | 14 | No Surveys Taken | | | | Not Applicable | | | | Not Applicable | | | | 7 | 2 | 0 | 9 |
| 6:00-6:59 | 7 | 0 | 0 | 7 | 0 | 0 | 0 | 0 | 0.0% | -- | -- | 0.0% | n/a | -- | -- | n/a | 5 | 2 | 1 | 8 |
| 7:00-7:59 | 5 | 0 | 0 | 5 | 3 | 0 | 0 | 3 | 60.0% | -- | -- | 60.0% | 0.40 | -- | -- | 0.40 | 7 | 0 | 0 | 7 |
| 8:00-8:59 | 6 | 0 | 0 | 6 | 5 | 0 | 1 | 6 | 83.3% | -- | -- | 100.0% | 0.20 | -- | -- | 0.00 | 4 | 0 | 0 | 4 |
| 9:00-9:59 | 4 | 0 | 1 | 5 | 3 | 1 | 1 | 5 | 75.0% | -- | 100.0% | 100.0% | 0.33 | -- | -- | 0.00 | 7 | 0 | 0 | 7 |
| 10:00-10:59 | 2 | 0 | 1 | 3 | 4 | 1 | 0 | 5 | 200.0% | -- | 0.0% | 166.7% | <5> | -- | -- | <5> | 4 | 0 | 0 | 4 |
| 11:00-11:59 | 4 | 1 | 1 | 6 | 4 | 1 | 0 | 5 | 100.0% | 100.0% | 0.0% | 83.3% | 0.00 | -- | -- | 0.20 | 0 | 2 | 0 | 2 |
| 12:00-12:59 | 3 | 0 | 0 | 3 | 2 | 0 | 0 | 2 | 66.7% | -- | -- | 66.7% | 0.49 | -- | -- | 0.49 | 7 | 0 | 1 | 8 |
| 13:00-13:59 | 3 | 1 | 1 | 5 | 3 | 0 | 3 | 6 | 100.0% | 0.0% | 300.0% | 120.0% | 0.00 | -- | -- | <5> | 3 | 0 | 0 | 3 |
| 14:00-14:59 | 2 | 0 | 0 | 2 | 2 | 0 | 0 | 2 | 100.0% | -- | -- | 100.0% | 0.00 | -- | -- | 0.00 | 6 | 1 | 0 | 7 |
| 15:00-15:59 | 4 | 1 | 1 | 6 | 3 | 1 | 1 | 5 | 75.0% | 100.0% | 100.0% | 83.3% | 0.33 | -- | -- | 0.20 | 7 | 0 | 1 | 8 |
| 16:00-16:59 | 4 | 2 | 1 | 7 | 3 | 3 | 0 | 6 | 75.0% | 150.0% | 0.0% | 85.7% | 0.33 | <5> | -- | 0.16 | 3 | 0 | 0 | 3 |
| 17:00-17:59 | 10 | 2 | 0 | 12 | 8 | 1 | 0 | 9 | 80.0% | 50.0% | -- | 75.0% | 0.16 | 0.98 | -- | 0.17 | 6 | 0 | 0 | 6 |
| 18:00-18:59 | 5 | 1 | 1 | 7 | 0 | 0 | 1 | 1 | 0.0% | 0.0% | 100.0% | 14.3% | n/a | -- | -- | 0.98 | 5 | 0 | 0 | 5 |
| 19:00-19:59 | 4 | 0 | 0 | 4 | No Surveys Taken | | | | Not Applicable | | | | Not Applicable | | | | 2 | 0 | 0 | 2 |
| 20:00-20:59 | 2 | 0 | 0 | 2 | No Surveys Taken | | | | Not Applicable | | | | Not Applicable | | | | 2 | 0 | 0 | 2 |
| 21:00-21:59 | 2 | 0 | 0 | 2 | No Surveys Taken | | | | Not Applicable | | | | Not Applicable | | | | 1 | 0 | 0 | 1 |
| 22:00-22:59 | 2 | 0 | 1 | 3 | No Surveys Taken | | | | Not Applicable | | | | Not Applicable | | | | 4 | 1 | 0 | 5 |
| 23:00-23:59 | 1 | 0 | 0 | 1 | No Surveys Taken | | | | Not Applicable | | | | Not Applicable | | | | 1 | 0 | 0 | 1 |
| **TOTALS** | 89 | 8 | 8 | **105** | 40 | 8 | 7 | **55** | 44.9% | 100.0% | 87.5% | 52.4% | 0.12 | 0.00 | 0.14 | 0.09 | 82 | 8 | 3 | **93** |
| Percentages | 84.8% | 7.6% | 7.6% | 100.0% | 70.0% | 10.0% | 10.0% | 100.0% | | | | | | | | | 88.2% | 8.6% | 3.2% | 100.0% |
| **Proportion of Daily Traffic During Survey Period** | | | | | | | | | | | | | | | | | | | | |
| Volume | 54 | 7 | 6 | **67** | | | | | | | | | | | | | 59 | 5 | 3 | **67** |
| Percentages | 60.7% | 87.5% | 75.0% | 63.8% | | | | | | | | | | | | | 72.0% | 62.5% | 100.0% | 72.0% |

[1] This includes Motorcycles, Cars & Trailers, plus 2 Axles long

[2] This includes Buses and Trucks with 2 thru 4 Axles

[3] This includes double or multi trailer trucks

[4] Confidence interval at 95% confidence level of a proporation of 0.50.

[5] Surveyed vehicles more than counted vehicles for this time period.

**Site 3**
**Site Location: Salome Highway East of Courthouse Road**
**Survey Date: Wednesday, September 15, 1999**

| | Actual Volume (Direction of Survey-WB) | | | | Surveyed Trips (Direction of Survey-WB) | | | | Percentage of Volume Sampled (Direction of Survey-WB) | | | | Confidence Interval [4] (Direction of Survey-WB) | | | | Actual Volume (EB Direction) | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Time of Day | Light [1] | Medium [2] | Heavy [3] | Total | Light [1] | Medium [2] | Heavy [3] | Total | Light [1] | Medium [2] | Heavy [3] | Total | Light [1] | Medium [2] | Heavy [3] | Total | Light [1] | Medium [2] | Heavy [3] | Total |
| 0:00-0:59 | 1 | 0 | 0 | 1 | No Surveys Taken | | | | Not Applicable | | | | Not Applicable | | | | 1 | 0 | 0 | 1 |
| 1:00-1:59 | 1 | 0 | 0 | 1 | No Surveys Taken | | | | Not Applicable | | | | Not Applicable | | | | 0 | 0 | 0 | 0 |
| 2:00-2:59 | 1 | 0 | 0 | 1 | No Surveys Taken | | | | Not Applicable | | | | Not Applicable | | | | 1 | 0 | 0 | 1 |
| 3:00-3:59 | 2 | 0 | 0 | 2 | No Surveys Taken | | | | Not Applicable | | | | Not Applicable | | | | 4 | 0 | 0 | 4 |
| 4:00-4:59 | 1 | 0 | 0 | 1 | No Surveys Taken | | | | Not Applicable | | | | Not Applicable | | | | 4 | 0 | 0 | 4 |
| 5:00-5:59 | 12 | 0 | 0 | 12 | No Surveys Taken | | | | Not Applicable | | | | Not Applicable | | | | 4 | 0 | 0 | 4 |
| 6:00-6:59 | 10 | 1 | 2 | 13 | 1 | 1 | 0 | 2 | 10.0% | 100.0% | 0.0% | 15.4% | 0.98 | -- | n/a | 0.66 | 11 | 0 | 0 | 11 |
| 7:00-7:59 | 9 | 1 | 0 | 10 | 6 | 1 | 0 | 7 | 66.7% | 100.0% | -- | 70.0% | 0.25 | -- | -- | 0.21 | 8 | 2 | 0 | 10 |
| 8:00-8:59 | 2 | 2 | 1 | 5 | 4 | 1 | 0 | 5 | 200.0% | 50.0% | 0.0% | 100.0% | <5> | 0.98 | -- | 0.00 | 3 | 0 | 1 | 4 |
| 9:00-9:59 | 6 | 1 | 0 | 7 | 3 | 1 | 1 | 5 | 50.0% | 100.0% | -- | 71.4% | 0.44 | -- | -- | 0.25 | 9 | 0 | 1 | 10 |
| 10:00-10:59 | 6 | 0 | 1 | 7 | 4 | 0 | 1 | 5 | 66.7% | -- | 100.0% | 71.4% | 0.31 | -- | -- | 0.25 | 12 | 0 | 0 | 12 |
| 11:00-11:59 | 6 | 2 | 1 | 9 | 4 | 2 | 1 | 7 | 66.7% | 100.0% | 100.0% | 77.8% | 0.31 | 0.00 | -- | 0.19 | 12 | 0 | 0 | 12 |
| 12:00-12:59 | 5 | 0 | 0 | 5 | 2 | 0 | 0 | 2 | 40.0% | -- | -- | 40.0% | 0.60 | -- | -- | 0.60 | 3 | 0 | 1 | 4 |
| 13:00-13:59 | 7 | 3 | 0 | 10 | 3 | 1 | 0 | 4 | 42.9% | 33.3% | -- | 40.0% | 0.46 | 0.98 | -- | 0.40 | 9 | 2 | 0 | 11 |
| 14:00-14:59 | 10 | 1 | 0 | 11 | 9 | 3 | 0 | 12 | 90.0% | 300.0% | -- | 109.1% | 0.11 | -- | -- | <5> | 12 | 1 | 0 | 13 |
| 15:00-15:59 | 6 | 1 | 0 | 7 | 3 | 1 | 0 | 4 | 50.0% | 100.0% | -- | 57.1% | 0.44 | -- | -- | 0.35 | 5 | 1 | 0 | 6 |
| 16:00-16:59 | 9 | 0 | 1 | 10 | 7 | 0 | 0 | 7 | 77.8% | -- | 0.0% | 70.0% | 0.19 | -- | -- | 0.21 | 6 | 0 | 0 | 6 |
| 17:00-17:59 | 15 | 0 | 0 | 15 | 9 | 0 | 0 | 9 | 60.0% | -- | -- | 60.0% | 0.21 | -- | -- | 0.21 | 15 | 1 | 1 | 17 |
| 18:00-18:59 | 9 | 0 | 1 | 10 | No Surveys Taken | | | | Not Applicable | | | | Not Applicable | | | | 14 | 1 | 0 | 15 |
| 19:00-19:59 | 7 | 0 | 0 | 7 | No Surveys Taken | | | | Not Applicable | | | | Not Applicable | | | | 5 | 0 | 0 | 5 |
| 20:00-20:59 | 5 | 0 | 0 | 5 | No Surveys Taken | | | | Not Applicable | | | | Not Applicable | | | | 1 | 0 | 0 | 1 |
| 21:00-21:59 | 3 | 0 | 0 | 3 | No Surveys Taken | | | | Not Applicable | | | | Not Applicable | | | | 2 | 0 | 0 | 2 |
| 22:00-22:59 | 1 | 0 | 0 | 1 | No Surveys Taken | | | | Not Applicable | | | | Not Applicable | | | | 2 | 0 | 0 | 2 |
| 23:00-23:59 | 2 | 0 | 0 | 2 | No Surveys Taken | | | | Not Applicable | | | | Not Applicable | | | | 1 | 0 | 0 | 1 |
| **TOTALS** | 136 | 12 | 7 | **155** | 55 | 11 | 3 | **69** | 40.4% | 91.7% | 42.9% | 44.5% | 0.10 | 0.09 | 0.46 | 0.09 | 144 | 8 | 4 | **156** |
| Percentages | 87.7% | 7.7% | 4.5% | 100.0% | 80.0% | 20.0% | 0.0% | 100.0% | | | | | | | | | 92.3% | 5.1% | 2.6% | 100.0% |
| **Proportion of Daily Traffic During Survey Period** | | | | | | | | | | | | | | | | | | | | |
| Volume | 91 | 12 | 6 | **109** | | | | | | | | | | | | | 105 | 7 | 4 | **116** |
| Percentages | 66.9% | 100.0% | 85.7% | 70.3% | | | | | | | | | | | | | 72.9% | 87.5% | 100.0% | 74.4% |

[1] This includes Motorcycles, Cars & Trailers, plus 2 Axles long

[2] This includes Buses and Trucks with 2 thru 4 Axles

[3] This includes double or multi trailer trucks

[4] Confidence interval at 95% confidence level of a proporation of 0.50.

[5] Surveyed vehicles more than counted vehicles for this time period.

**Site 4**
**Site Location: I-10 at 477th Avenue**
**Survey Date: Tuesday, October 5, 1999**

| | Actual Volume (Direction of Survey-WB) | | | | Surveyed Trips (Direction of Survey-WB) | | | | Percentage of Volume Sampled (Direction of Survey-WB) | | | | Confidence Interval [4] (Direction of Survey-WB) | | | | Actual Volume (EB Direction) | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Time of Day | Light [1] | Medium [2] | Heavy [3] | Total | Light [1] | Medium [2] | Heavy [3] | Total | Light [1] | Medium [2] | Heavy [3] | Total | Light [1] | Medium [2] | Heavy [3] | Total | Light [1] | Medium [2] | Heavy [3] | Total |
| 0:00-0:59 | 40 | 5 | 131 | 176 | No Surveys Taken | | | | Not Applicable | | | | Not Applicable | | | | 89 | 21 | 197 | 307 |
| 1:00-1:59 | 39 | 7 | 117 | 163 | No Surveys Taken | | | | Not Applicable | | | | Not Applicable | | | | 47 | 9 | 197 | 253 |
| 2:00-2:59 | 31 | 7 | 87 | 125 | No Surveys Taken | | | | Not Applicable | | | | Not Applicable | | | | 51 | 11 | 211 | 273 |
| 3:00-3:59 | 33 | 3 | 73 | 109 | No Surveys Taken | | | | Not Applicable | | | | Not Applicable | | | | 45 | 5 | 193 | 243 |
| 4:00-4:59 | 45 | 8 | 76 | 129 | No Surveys Taken | | | | Not Applicable | | | | Not Applicable | | | | 39 | 10 | 216 | 265 |
| 5:00-5:59 | 67 | 5 | 85 | 157 | No Surveys Taken | | | | Not Applicable | | | | Not Applicable | | | | 48 | 8 | 203 | 259 |
| 6:00-6:59 | 129 | 4 | 94 | 227 | 0 | 0 | 0 | 0 | 0.0% | 0.0% | 0.0% | 0.0% | n/a | n/a | n/a | n/a | 56 | 6 | 210 | 272 |
| 7:00-7:59 | 132 | 8 | 139 | 279 | 11 | 4 | 6 | 21 | 8.3% | 50.0% | 4.3% | 7.5% | 0.28 | 0.37 | 0.39 | 0.21 | 90 | 11 | 201 | 302 |
| 8:00-8:59 | 183 | 7 | 136 | 326 | 24 | 13 | 19 | 56 | 13.1% | 185.7% | 14.0% | 17.2% | 0.19 | <5> | 0.21 | 0.12 | 121 | 18 | 210 | 349 |
| 9:00-9:59 | 204 | 7 | 225 | 436 | 30 | 8 | 33 | 71 | 14.7% | 114.3% | 14.7% | 16.3% | 0.17 | <5> | 0.16 | 0.11 | 166 | 21 | 207 | 394 |
| 10:00-10:59 | 221 | 15 | 210 | 446 | 35 | 7 | 29 | 71 | 15.8% | 46.7% | 13.8% | 15.9% | 0.15 | 0.28 | 0.17 | 0.11 | 195 | 23 | 182 | 400 |
| 11:00-11:59 | 239 | 10 | 223 | 472 | 37 | 7 | 31 | 75 | 15.5% | 70.0% | 13.9% | 15.9% | 0.15 | 0.21 | 0.16 | 0.10 | 220 | 16 | 210 | 446 |
| 12:00-12:59 | 184 | 18 | 239 | 441 | 48 | 5 | 23 | 76 | 26.1% | 27.8% | 9.6% | 17.2% | 0.12 | 0.38 | 0.19 | 0.10 | 248 | 18 | 164 | 430 |
| 13:00-13:59 | 196 | 8 | 248 | 452 | 37 | 5 | 21 | 63 | 18.9% | 62.5% | 8.5% | 13.9% | 0.15 | 0.29 | 0.21 | 0.11 | 288 | 13 | 169 | 470 |
| 14:00-14:59 | 181 | 7 | 234 | 422 | 39 | 7 | 26 | 72 | 21.5% | 100.0% | 11.1% | 17.1% | 0.14 | 0.00 | 0.18 | 0.11 | 281 | 21 | 148 | 450 |
| 15:00-15:59 | 166 | 6 | 227 | 399 | 28 | 13 | 28 | 69 | 16.9% | 216.7% | 12.3% | 17.3% | 0.17 | <5> | 0.17 | 0.11 | 329 | 29 | 184 | 542 |
| 16:00-16:59 | 179 | 9 | 209 | 397 | 41 | 14 | 16 | 71 | 22.9% | 155.6% | 7.7% | 17.9% | 0.13 | <5> | 0.24 | 0.11 | 272 | 22 | 202 | 496 |
| 17:00-17:59 | 139 | 7 | 193 | 339 | 0 | 0 | 2 | 2 | 0.0% | 0.0% | 1.0% | 0.6% | n/a | n/a | 0.69 | 0.69 | 234 | 20 | 206 | 460 |
| 18:00-18:59 | 116 | 10 | 246 | 372 | No Surveys Taken | | | | Not Applicable | | | | Not Applicable | | | | 185 | 12 | 212 | 409 |
| 19:00-19:59 | 94 | 9 | 222 | 325 | No Surveys Taken | | | | Not Applicable | | | | Not Applicable | | | | 177 | 10 | 258 | 445 |
| 20:00-20:59 | 77 | 2 | 224 | 303 | No Surveys Taken | | | | Not Applicable | | | | Not Applicable | | | | 140 | 22 | 194 | 356 |
| 21:00-21:59 | 79 | 13 | 203 | 295 | No Surveys Taken | | | | Not Applicable | | | | Not Applicable | | | | 112 | 8 | 215 | 335 |
| 22:00-22:59 | 52 | 8 | 207 | 267 | No Surveys Taken | | | | Not Applicable | | | | Not Applicable | | | | 89 | 11 | 230 | 330 |
| 23:00-23:59 | 48 | 9 | 150 | 207 | No Surveys Taken | | | | Not Applicable | | | | Not Applicable | | | | 99 | 22 | 203 | 324 |
| **TOTALS** | 2874 | 192 | 4198 | **7264** | 330 | 83 | 234 | **647** | 11.5% | 43.2% | 5.6% | 8.9% | 0.05 | 0.08 | 0.06 | 0.04 | 3621 | 367 | 4822 | **8810** |
| Percentages | 39.6% | 2.6% | 57.8% | 100.0% | 50.0% | 10.0% | 40.0% | 100.0% | | | | | | | | | 41.1% | 4.2% | 54.7% | 100.0% |
| **Proportion of Daily Traffic During Survey Period** | | | | | | | | | | | | | | | | | | | | |
| Volume | 2153 | 106 | 2377 | **4636** | | | | | | | | | | | | | 2500 | 218 | 2293 | **5011** |
| Percentages | 74.9% | 55.2% | 56.6% | 63.8% | | | | | | | | | | | | | 69.0% | 59.4% | 47.6% | 56.9% |

[1] This includes Motorcycles, Cars & Trailers, plus 2 Axles long

[2] This includes Buses and Trucks with 2 thru 4 Axles

[3] This includes double or multi trailer trucks

[4] Confidence interval at 95% confidence level of a proporation of 0.50.

[5] Surveyed vehicles more than counted vehicles for this time period.

**Site 5**
**Site Location: U.S. 60 at 355th Avenue**
**Survey Date: Thursday, September 16, 1999**

| | Actual Volume (Direction of Survey-WB) | | | | Surveyed Trips (Direction of Survey-WB) | | | | Percentage of Volume Sampled (Direction of Survey-WB) | | | | Confidence Interval [4] (Direction of Survey-WB) | | | | Actual Volume (EB Direction) | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Time of Day | Light [1] | Medium [2] | Heavy [3] | Total | Light [1] | Medium [2] | Heavy [3] | Total | Light [1] | Medium [2] | Heavy [3] | Total | Light [1] | Medium [2] | Heavy [3] | Total | Light [1] | Medium [2] | Heavy [3] | Total |
| 0:00-0:59 | 2 | 0 | 0 | 2 | No Surveys Taken | | | | Not Applicable | | | | Not Applicable | | | | 0 | 0 | 0 | 0 |
| 1:00-1:59 | 3 | 0 | 0 | 3 | No Surveys Taken | | | | Not Applicable | | | | Not Applicable | | | | 3 | 0 | 0 | 3 |
| 2:00-2:59 | 3 | 0 | 0 | 3 | No Surveys Taken | | | | Not Applicable | | | | Not Applicable | | | | 0 | 0 | 0 | 0 |
| 3:00-3:59 | 2 | 1 | 2 | 5 | No Surveys Taken | | | | Not Applicable | | | | Not Applicable | | | | 1 | 0 | 1 | 2 |
| 4:00-4:59 | 6 | 0 | 1 | 7 | No Surveys Taken | | | | Not Applicable | | | | Not Applicable | | | | 7 | 0 | 0 | 7 |
| 5:00-5:59 | 12 | 0 | 0 | 12 | No Surveys Taken | | | | Not Applicable | | | | Not Applicable | | | | 16 | 0 | 1 | 17 |
| 6:00-6:59 | 19 | 3 | 3 | 25 | 0 | 0 | 0 | 0 | 0.0% | 0.0% | 0.0% | 0.0% | n/a | n/a | n/a | n/a | 19 | 2 | 3 | 24 |
| 7:00-7:59 | 22 | 1 | 0 | 23 | 19 | 1 | 0 | 20 | 86.4% | 100.0% | -- | 87.0% | 0.08 | -- | -- | 0.08 | 29 | 3 | 0 | 32 |
| 8:00-8:59 | 20 | 3 | 0 | 23 | 14 | 3 | 0 | 17 | 70.0% | 100.0% | -- | 73.9% | 0.15 | 0.00 | -- | 0.12 | 36 | 3 | 4 | 43 |
| 9:00-9:59 | 31 | 2 | 0 | 33 | 25 | 0 | 1 | 26 | 80.6% | 0.0% | -- | 78.8% | 0.09 | n/a | -- | 0.09 | 33 | 1 | 0 | 34 |
| 10:00-10:59 | 32 | 2 | 4 | 38 | 23 | 2 | 1 | 26 | 71.9% | 100.0% | 25.0% | 68.4% | 0.11 | 0.00 | 0.98 | 0.11 | 34 | 3 | 0 | 37 |
| 11:00-11:59 | 42 | 0 | 1 | 43 | 25 | 0 | 0 | 25 | 59.5% | -- | 0.0% | 58.1% | 0.13 | -- | -- | 0.13 | 49 | 0 | 2 | 51 |
| 12:00-12:59 | 48 | 1 | 2 | 51 | 11 | 0 | 0 | 11 | 22.9% | 0.0% | 0.0% | 21.6% | 0.26 | -- | n/a | 0.26 | 43 | 1 | 2 | 46 |
| 13:00-13:59 | 38 | 0 | 2 | 40 | 22 | 1 | 1 | 24 | 57.9% | -- | 50.0% | 60.0% | 0.14 | -- | 0.98 | 0.13 | 39 | 2 | 1 | 42 |
| 14:00-14:59 | 30 | 1 | 2 | 33 | 22 | 2 | 2 | 26 | 73.3% | 200.0% | 100.0% | 78.8% | 0.11 | -- | 0.00 | 0.09 | 41 | 2 | 2 | 45 |
| 15:00-15:59 | 49 | 2 | 4 | 55 | 32 | 0 | 1 | 33 | 65.3% | 0.0% | 25.0% | 60.0% | 0.10 | n/a | 0.98 | 0.11 | 46 | 0 | 3 | 49 |
| 16:00-16:59 | 42 | 1 | 1 | 44 | 28 | 0 | 0 | 28 | 66.7% | 0.0% | 0.0% | 63.6% | 0.11 | -- | -- | 0.11 | 27 | 2 | 2 | 31 |
| 17:00-17:59 | 29 | 0 | 2 | 31 | 12 | 0 | 0 | 12 | 41.4% | -- | 0.0% | 38.7% | 0.22 | -- | n/a | 0.23 | 39 | 1 | 3 | 43 |
| 18:00-18:59 | 25 | 0 | 1 | 26 | No Surveys Taken | | | | Not Applicable | | | | Not Applicable | | | | 32 | 1 | 0 | 33 |
| 19:00-19:59 | 16 | 0 | 2 | 18 | No Surveys Taken | | | | Not Applicable | | | | Not Applicable | | | | 11 | 0 | 2 | 13 |
| 20:00-20:59 | 15 | 0 | 1 | 16 | No Surveys Taken | | | | Not Applicable | | | | Not Applicable | | | | 11 | 0 | 1 | 12 |
| 21:00-21:59 | 17 | 0 | 2 | 19 | No Surveys Taken | | | | Not Applicable | | | | Not Applicable | | | | 7 | 0 | 0 | 7 |
| 22:00-22:59 | 26 | 0 | 0 | 26 | No Surveys Taken | | | | Not Applicable | | | | Not Applicable | | | | 1 | 0 | 0 | 1 |
| 23:00-23:59 | 3 | 0 | 3 | 6 | No Surveys Taken | | | | Not Applicable | | | | Not Applicable | | | | 2 | 0 | 0 | 2 |
| **TOTALS** | 532 | 17 | 33 | **582** | 233 | 9 | 6 | **248** | 43.8% | 52.9% | 18.2% | 42.6% | 0.05 | 0.23 | 0.37 | 0.05 | 526 | 21 | 27 | **574** |
| Percentages | 91.4% | 2.9% | 5.7% | 100.0% | 90.0% | 0.0% | 0.0% | 100.0% | | | | | | | | | 91.6% | 3.7% | 4.7% | 100.0% |
| **Proportion of Daily Traffic During Survey Period** | | | | | | | | | | | | | | | | | | | | |
| Volume | 402 | 16 | 21 | **439** | | | | | | | | | | | | | 435 | 20 | 22 | **477** |
| Percentages | 75.6% | 94.1% | 63.6% | 75.4% | | | | | | | | | | | | | 82.7% | 95.2% | 81.5% | 83.1% |

[1] This includes Motorcycles, Cars & Trailers, plus 2 Axles long

[2] This includes Buses and Trucks with 2 thru 4 Axles

[3] This includes double or multi trailer trucks

[4] Confidence interval at 95% confidence level of a proporation of 0.50.

[5] Surveyed vehicles more than counted vehicles for this time period.

**Site 6**
**Site Location: U.S. 93 at Maricopa/Yavapai County Boundary**
**Survey Date: Wednesday, October 13, 1999**

| | Actual Volume (Direction of Survey-NB) | | | | Surveyed Trips (Direction of Survey-NB) | | | | Percentage of Volume Sampled (Direction of Survey-NB) | | | | Confidence Interval [4] (Direction of Survey-NB) | | | | Actual Volume (SB Direction) | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Time of Day | Light [1] | Medium [2] | Heavy [3] | Total | Light [1] | Medium [2] | Heavy [3] | Total | Light [1] | Medium [2] | Heavy [3] | Total | Light [1] | Medium [2] | Heavy [3] | Total | Light [1] | Medium [2] | Heavy [3] | Total |
| 0:00-0:59 | 24 | 2 | 29 | 55 | No Surveys Taken | | | | Not Applicable | | | | Not Applicable | | | | 13 | 0 | 16 | 29 |
| 1:00-1:59 | 14 | 1 | 29 | 44 | No Surveys Taken | | | | Not Applicable | | | | Not Applicable | | | | 12 | 1 | 4 | 17 |
| 2:00-2:59 | 11 | 6 | 14 | 31 | No Surveys Taken | | | | Not Applicable | | | | Not Applicable | | | | 12 | 0 | 24 | 36 |
| 3:00-3:59 | 14 | 4 | 14 | 32 | No Surveys Taken | | | | Not Applicable | | | | Not Applicable | | | | 22 | 1 | 17 | 40 |
| 4:00-4:59 | 19 | 12 | 20 | 51 | No Surveys Taken | | | | Not Applicable | | | | Not Applicable | | | | 41 | 2 | 18 | 61 |
| 5:00-5:59 | 69 | 8 | 27 | 104 | No Surveys Taken | | | | Not Applicable | | | | Not Applicable | | | | 67 | 5 | 18 | 90 |
| 6:00-6:59 | 116 | 17 | 25 | 158 | 0 | 0 | 0 | 0 | 0.0% | 0.0% | 0.0% | 0.0% | n/a | n/a | n/a | n/a | 114 | 1 | 17 | 132 |
| 7:00-7:59 | 138 | 21 | 17 | 176 | 6 | 0 | 0 | 6 | 4.3% | 0.0% | 0.0% | 3.4% | 0.39 | n/a | n/a | 0.39 | 209 | 6 | 28 | 243 |
| 8:00-8:59 | 151 | 17 | 29 | 197 | 55 | 0 | 0 | 55 | 36.4% | 0.0% | 0.0% | 27.9% | 0.11 | n/a | n/a | 0.11 | 167 | 2 | 31 | 200 |
| 9:00-9:59 | 202 | 12 | 29 | 243 | 64 | 0 | 0 | 64 | 31.7% | 0.0% | 0.0% | 26.3% | 0.10 | n/a | n/a | 0.11 | 152 | 11 | 32 | 195 |
| 10:00-10:59 | 249 | 21 | 34 | 304 | 55 | 1 | 1 | 57 | 22.1% | 4.8% | 2.9% | 18.8% | 0.12 | 0.98 | 0.98 | 0.12 | 187 | 10 | 36 | 233 |
| 11:00-11:59 | 223 | 27 | 29 | 279 | 41 | 0 | 0 | 41 | 18.4% | 0.0% | 0.0% | 14.7% | 0.14 | n/a | n/a | 0.14 | 211 | 8 | 46 | 265 |
| 12:00-12:59 | 203 | 22 | 29 | 254 | 26 | 0 | 0 | 26 | 12.8% | 0.0% | 0.0% | 10.2% | 0.18 | n/a | n/a | 0.18 | 224 | 13 | 45 | 282 |
| 13:00-13:59 | 232 | 14 | 38 | 284 | 59 | 0 | 0 | 59 | 25.4% | 0.0% | 0.0% | 20.8% | 0.11 | n/a | n/a | 0.11 | 238 | 6 | 33 | 277 |
| 14:00-14:59 | 202 | 15 | 36 | 253 | 56 | 0 | 0 | 56 | 27.7% | 0.0% | 0.0% | 22.1% | 0.11 | n/a | n/a | 0.12 | 218 | 6 | 42 | 266 |
| 15:00-15:59 | 241 | 24 | 39 | 304 | 46 | 1 | 0 | 47 | 19.1% | 4.2% | 0.0% | 15.5% | 0.13 | 0.98 | n/a | 0.13 | 256 | 10 | 24 | 290 |
| 16:00-16:59 | 218 | 17 | 34 | 269 | 33 | 0 | 0 | 33 | 15.1% | 0.0% | 0.0% | 12.3% | 0.16 | n/a | n/a | 0.16 | 227 | 7 | 35 | 269 |
| 17:00-17:59 | 197 | 15 | 27 | 239 | 0 | 0 | 0 | 0 | 0.0% | 0.0% | 0.0% | 0.0% | n/a | n/a | n/a | n/a | 183 | 2 | 34 | 219 |
| 18:00-18:59 | 163 | 20 | 19 | 202 | No Surveys Taken | | | | Not Applicable | | | | Not Applicable | | | | 166 | 4 | 39 | 209 |
| 19:00-19:59 | 120 | 11 | 31 | 162 | No Surveys Taken | | | | Not Applicable | | | | Not Applicable | | | | 104 | 3 | 24 | 131 |
| 20:00-20:59 | 119 | 3 | 23 | 145 | No Surveys Taken | | | | Not Applicable | | | | Not Applicable | | | | 58 | 6 | 23 | 87 |
| 21:00-21:59 | 109 | 8 | 23 | 140 | No Surveys Taken | | | | Not Applicable | | | | Not Applicable | | | | 46 | 6 | 22 | 74 |
| 22:00-22:59 | 62 | 1 | 27 | 90 | No Surveys Taken | | | | Not Applicable | | | | Not Applicable | | | | 31 | 3 | 30 | 64 |
| 23:00-23:59 | 32 | 3 | 22 | 57 | No Surveys Taken | | | | Not Applicable | | | | Not Applicable | | | | 16 | 2 | 13 | 31 |
| **TOTALS** | 3128 | 301 | 644 | **4073** | 441 | 2 | 1 | **444** | 14.1% | 0.7% | 0.2% | 10.9% | 0.04 | 0.69 | 0.98 | 0.04 | 2974 | 115 | 651 | **3740** |
| Percentages | 76.8% | 7.4% | 15.8% | 100.0% | 100.0% | 0.0% | 0.0% | 100.0% | | | | | | | | | 79.5% | 3.1% | 17.4% | 100.0% |
| **Proportion of Daily Traffic During Survey Period** | | | | | | | | | | | | | | | | | | | | |
| Volume | 2372 | 222 | 366 | **2960** | | | | | | | | | | | | | 2386 | 82 | 403 | **2871** |
| Percentages | 75.8% | 73.8% | 56.8% | 72.7% | | | | | | | | | | | | | 80.2% | 71.3% | 61.9% | 76.8% |

[1] This includes Motorcycles, Cars & Trailers, plus 2 Axles long

[2] This includes Buses and Trucks with 2 thru 4 Axles

[3] This includes double or multi trailer trucks

[4] Confidence interval at 95% confidence level of a proporation of 0.50.

[5] Surveyed vehicles more than counted vehicles for this time period.

**Site 7**
**Site Location: I-17 at Maricopa/Yavapai County Boundary**
**Survey Date: Thursday, October 7, 1999**

| | Actual Volume (Direction of Survey-NB) | | | | Surveyed Trips (Direction of Survey-NB) | | | | Percentage of Volume Sampled (Direction of Survey-NB) | | | | Confidence Interval [4] (Direction of Survey-NB) | | | | Actual Volume (SB Direction) | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Time of Day | Light [1] | Medium [2] | Heavy [3] | Total | Light [1] | Medium [2] | Heavy [3] | Total | Light [1] | Medium [2] | Heavy [3] | Total | Light [1] | Medium [2] | Heavy [3] | Total | Light [1] | Medium [2] | Heavy [3] | Total |
| 0:00-0:59 | 265 | 3 | 48 | 316 | No Surveys Taken | | | | Not Applicable | | | | Not Applicable | | | | 85 | 4 | 65 | 154 |
| 1:00-1:59 | 80 | 2 | 42 | 124 | No Surveys Taken | | | | Not Applicable | | | | Not Applicable | | | | 56 | 4 | 59 | 119 |
| 2:00-2:59 | 32 | 5 | 51 | 88 | No Surveys Taken | | | | Not Applicable | | | | Not Applicable | | | | 45 | 7 | 81 | 133 |
| 3:00-3:59 | 26 | 6 | 53 | 85 | No Surveys Taken | | | | Not Applicable | | | | Not Applicable | | | | 54 | 6 | 62 | 122 |
| 4:00-4:59 | 114 | 15 | 64 | 193 | No Surveys Taken | | | | Not Applicable | | | | Not Applicable | | | | 201 | 7 | 86 | 294 |
| 5:00-5:59 | 289 | 15 | 72 | 376 | No Surveys Taken | | | | Not Applicable | | | | Not Applicable | | | | 403 | 9 | 90 | 502 |
| 6:00-6:59 | 489 | 23 | 84 | 596 | 0 | 0 | 0 | 0 | 0.0% | 0.0% | 0.0% | 0.0% | n/a | n/a | n/a | n/a | 476 | 11 | 73 | 560 |
| 7:00-7:59 | 674 | 31 | 80 | 785 | 107 | 6 | 3 | 116 | 15.9% | 19.4% | 3.8% | 14.8% | 0.09 | 0.37 | 0.56 | 0.08 | 520 | 18 | 86 | 624 |
| 8:00-8:59 | 767 | 36 | 97 | 900 | 123 | 1 | 2 | 126 | 16.0% | 2.8% | 2.1% | 14.0% | 0.08 | 0.98 | 0.69 | 0.08 | 547 | 17 | 110 | 674 |
| 9:00-9:59 | 1085 | 35 | 102 | 1222 | 94 | 4 | 5 | 103 | 8.7% | 11.4% | 4.9% | 8.4% | 0.10 | 0.47 | 0.43 | 0.09 | 691 | 25 | 158 | 874 |
| 10:00-10:59 | 1097 | 26 | 114 | 1237 | 124 | 2 | 2 | 128 | 11.3% | 7.7% | 1.8% | 10.3% | 0.08 | 0.68 | 0.69 | 0.08 | 721 | 15 | 116 | 852 |
| 11:00-11:59 | 888 | 19 | 130 | 1037 | 56 | 1 | 2 | 59 | 6.3% | 5.3% | 1.5% | 5.7% | 0.13 | 0.98 | 0.69 | 0.12 | 774 | 23 | 138 | 935 |
| 12:00-12:59 | 842 | 23 | 119 | 984 | 105 | 4 | 1 | 110 | 12.5% | 17.4% | 0.8% | 11.2% | 0.09 | 0.46 | 0.98 | 0.09 | 700 | 30 | 145 | 875 |
| 13:00-13:59 | 887 | 16 | 90 | 993 | 123 | 6 | 3 | 132 | 13.9% | 37.5% | 3.3% | 13.3% | 0.08 | 0.33 | 0.56 | 0.08 | 808 | 30 | 130 | 968 |
| 14:00-14:59 | 973 | 24 | 103 | 1100 | 99 | 1 | 2 | 102 | 10.2% | 4.2% | 1.9% | 9.3% | 0.09 | 0.98 | 0.69 | 0.09 | 934 | 36 | 130 | 1100 |
| 15:00-15:59 | 1039 | 13 | 88 | 1140 | 82 | 0 | 2 | 84 | 7.9% | 0.0% | 2.3% | 7.4% | 0.10 | n/a | 0.69 | 0.10 | 1010 | 37 | 98 | 1145 |
| 16:00-16:59 | 1049 | 17 | 89 | 1155 | 39 | 2 | 2 | 43 | 3.7% | 11.8% | 2.2% | 3.7% | 0.15 | 0.67 | 0.69 | 0.15 | 1099 | 29 | 118 | 1246 |
| 17:00-17:59 | 948 | 16 | 79 | 1043 | 0 | 0 | 0 | 0 | 0.0% | 0.0% | 0.0% | 0.0% | n/a | n/a | n/a | n/a | 989 | 23 | 102 | 1114 |
| 18:00-18:59 | 790 | 9 | 68 | 867 | No Surveys Taken | | | | Not Applicable | | | | Not Applicable | | | | 873 | 14 | 81 | 968 |
| 19:00-19:59 | 594 | 13 | 73 | 680 | No Surveys Taken | | | | Not Applicable | | | | Not Applicable | | | | 637 | 13 | 90 | 740 |
| 20:00-20:59 | 515 | 10 | 48 | 573 | No Surveys Taken | | | | Not Applicable | | | | Not Applicable | | | | 452 | 11 | 79 | 542 |
| 21:00-21:59 | 403 | 4 | 58 | 465 | No Surveys Taken | | | | Not Applicable | | | | Not Applicable | | | | 327 | 9 | 82 | 418 |
| 22:00-22:59 | 266 | 5 | 40 | 311 | No Surveys Taken | | | | Not Applicable | | | | Not Applicable | | | | 240 | 5 | 65 | 310 |
| 23:00-23:59 | 194 | 3 | 46 | 243 | No Surveys Taken | | | | Not Applicable | | | | Not Applicable | | | | 137 | 10 | 73 | 220 |
| **TOTALS** | 14306 | 369 | 1838 | **16513** | 952 | 27 | 24 | **1003** | 6.7% | 7.3% | 1.3% | 6.1% | 0.03 | 0.18 | 0.20 | 0.03 | 12779 | 393 | 2317 | **15489** |
| Percentages | 86.6% | 2.2% | 11.1% | 100.0% | 90.0% | 0.0% | 0.0% | 100.0% | | | | | | | | | 82.5% | 2.5% | 15.0% | 100.0% |
| **Proportion of Daily Traffic During Survey Period** | | | | | | | | | | | | | | | | | | | | |
| Volume | 10738 | 279 | 1175 | **12192** | | | | | | | | | | | | | 9269 | 294 | 1404 | **10967** |
| Percentages | 75.1% | 75.6% | 63.9% | 73.8% | | | | | | | | | | | | | 72.5% | 74.8% | 60.6% | 70.8% |

[1] This includes Motorcycles, Cars & Trailers, plus 2 Axles long

[2] This includes Buses and Trucks with 2 thru 4 Axles

[3] This includes double or multi trailer trucks

[4] Confidence interval at 95% confidence level of a proporation of 0.50.

[5] Surveyed vehicles more than counted vehicles for this time period.

**Site 8**
**Site Location: SR 87/Beeline Highway East of Bush Highway**
**Survey Date: Tuesday, September 28, 1999**

| | Actual Volume (Direction of Survey-EB) | | | | Surveyed Trips (Direction of Survey-EB) | | | | Percentage of Volume Sampled (Direction of Survey-EB) | | | | Confidence Interval [4] (Direction of Survey-EB) | | | | Actual Volume (WB Direction) | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Time of Day | Light [1] | Medium [2] | Heavy [3] | Total | Light [1] | Medium [2] | Heavy [3] | Total | Light [1] | Medium [2] | Heavy [3] | Total | Light [1] | Medium [2] | Heavy [3] | Total | Light [1] | Medium [2] | Heavy [3] | Total |
| 0:00-0:59 | 25 | 2 | 5 | 32 | No Surveys Taken | | | | Not Applicable | | | | Not Applicable | | | | 20 | 1 | 6 | 27 |
| 1:00-1:59 | 24 | 1 | 8 | 33 | No Surveys Taken | | | | Not Applicable | | | | Not Applicable | | | | 20 | 1 | 6 | 27 |
| 2:00-2:59 | 10 | 0 | 4 | 14 | No Surveys Taken | | | | Not Applicable | | | | Not Applicable | | | | 13 | 0 | 4 | 17 |
| 3:00-3:59 | 18 | 2 | 11 | 31 | No Surveys Taken | | | | Not Applicable | | | | Not Applicable | | | | 12 | 2 | 9 | 23 |
| 4:00-4:59 | 45 | 3 | 6 | 54 | No Surveys Taken | | | | Not Applicable | | | | Not Applicable | | | | 34 | 0 | 6 | 40 |
| 5:00-5:59 | 101 | 2 | 12 | 115 | No Surveys Taken | | | | Not Applicable | | | | Not Applicable | | | | 73 | 2 | 9 | 84 |
| 6:00-6:59 | 160 | 7 | 13 | 180 | 0 | 0 | 0 | 0 | 0.0% | 0.0% | 0.0% | 0.0% | n/a | n/a | n/a | n/a | 114 | 5 | 7 | 126 |
| 7:00-7:59 | 193 | 6 | 15 | 214 | 40 | 0 | 1 | 41 | 20.7% | 0.0% | 6.7% | 19.2% | 0.14 | n/a | 0.98 | 0.14 | 127 | 4 | 16 | 147 |
| 8:00-8:59 | 222 | 6 | 14 | 242 | 50 | 2 | 0 | 52 | 22.5% | 33.3% | 0.0% | 21.5% | 0.12 | 0.62 | n/a | 0.12 | 160 | 6 | 10 | 176 |
| 9:00-9:59 | 255 | 9 | 16 | 280 | 26 | 5 | 3 | 34 | 10.2% | 55.6% | 18.8% | 12.1% | 0.18 | 0.31 | 0.53 | 0.16 | 200 | 2 | 12 | 214 |
| 10:00-10:59 | 238 | 6 | 8 | 252 | 68 | 5 | 2 | 75 | 28.6% | 83.3% | 25.0% | 29.8% | 0.10 | 0.20 | 0.64 | 0.10 | 243 | 3 | 21 | 267 |
| 11:00-11:59 | 194 | 5 | 18 | 217 | 46 | 1 | 3 | 50 | 23.7% | 20.0% | 16.7% | 23.0% | 0.13 | 0.98 | 0.53 | 0.12 | 225 | 3 | 14 | 242 |
| 12:00-12:59 | 193 | 7 | 19 | 219 | 49 | 1 | 2 | 52 | 25.4% | 14.3% | 10.5% | 23.7% | 0.12 | 0.98 | 0.67 | 0.12 | 191 | 3 | 11 | 205 |
| 13:00-13:59 | 216 | 4 | 8 | 228 | 53 | 0 | 1 | 54 | 24.5% | 0.0% | 12.5% | 23.7% | 0.12 | n/a | 0.98 | 0.12 | 222 | 4 | 11 | 237 |
| 14:00-14:59 | 187 | 5 | 15 | 207 | 48 | 2 | 1 | 51 | 25.7% | 40.0% | 6.7% | 24.6% | 0.12 | 0.60 | 0.98 | 0.12 | 267 | 7 | 8 | 282 |
| 15:00-15:59 | 208 | 5 | 3 | 216 | 42 | 0 | 2 | 44 | 20.2% | 0.0% | 66.7% | 20.4% | 0.14 | n/a | 0.49 | 0.13 | 226 | 4 | 12 | 242 |
| 16:00-16:59 | 188 | 7 | 8 | 203 | 53 | 0 | 0 | 53 | 28.2% | 0.0% | 0.0% | 26.1% | 0.11 | n/a | n/a | 0.12 | 252 | 5 | 16 | 273 |
| 17:00-17:59 | 140 | 6 | 6 | 152 | 33 | 1 | 1 | 35 | 23.6% | 16.7% | 16.7% | 23.0% | 0.15 | 0.98 | 0.98 | 0.15 | 218 | 3 | 6 | 227 |
| 18:00-18:59 | 100 | 3 | 6 | 109 | No Surveys Taken | | | | Not Applicable | | | | Not Applicable | | | | 178 | 4 | 11 | 193 |
| 19:00-19:59 | 91 | 3 | 8 | 102 | No Surveys Taken | | | | Not Applicable | | | | Not Applicable | | | | 116 | 3 | 8 | 127 |
| 20:00-20:59 | 55 | 3 | 6 | 64 | No Surveys Taken | | | | Not Applicable | | | | Not Applicable | | | | 77 | 6 | 10 | 93 |
| 21:00-21:59 | 45 | 1 | 6 | 52 | No Surveys Taken | | | | Not Applicable | | | | Not Applicable | | | | 39 | 0 | 1 | 40 |
| 22:00-22:59 | 53 | 1 | 10 | 64 | No Surveys Taken | | | | Not Applicable | | | | Not Applicable | | | | 40 | 0 | 8 | 48 |
| 23:00-23:59 | 24 | 2 | 2 | 28 | No Surveys Taken | | | | Not Applicable | | | | Not Applicable | | | | 22 | 1 | 3 | 26 |
| **TOTALS** | 2985 | 96 | 227 | **3308** | 508 | 17 | 16 | **541** | 17.0% | 17.7% | 7.0% | 16.4% | 0.04 | 0.22 | 0.24 | 0.04 | 3089 | 69 | 225 | **3383** |
| Percentages | 90.2% | 2.9% | 6.9% | 100.0% | 90.0% | 0.0% | 0.0% | 100.0% | | | | | | | | | 91.3% | 2.0% | 6.7% | 100.0% |
| **Proportion of Daily Traffic During Survey Period** | | | | | | | | | | | | | | | | | | | | |
| Volume | 2394 | 73 | 143 | **2610** | | | | | | | | | | | | | 2445 | 49 | 144 | **2638** |
| Percentages | 80.2% | 76.0% | 63.0% | 78.9% | | | | | | | | | | | | | 79.2% | 71.0% | 64.0% | 78.0% |

[1] This includes Motorcycles, Cars & Trailers, plus 2 Axles long

[2] This includes Buses and Trucks with 2 thru 4 Axles

[3] This includes double or multi trailer trucks

[4] Confidence interval at 95% confidence level of a proporation of 0.50.

[5] Surveyed vehicles more than counted vehicles for this time period.

**Site 9**
**Site Location: SR 88 South of First Water Road (Count Site Only)**
**Survey Date: Wednesday, September 22, 1999**

| | Actual Volume (Direction of Survey-EB) | | | | Surveyed Trips (Direction of Survey-EB) | | | | Percentage of Volume Sampled (Direction of Survey-EB) | | | | Confidence Interval [4] (Direction of Survey-EB) | | | | Actual Volume (WB Direction) | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Time of Day | Light [1] | Medium [2] | Heavy [3] | Total | Light [1] | Medium [2] | Heavy [3] | Total | Light [1] | Medium [2] | Heavy [3] | Total | Light [1] | Medium [2] | Heavy [3] | Total | Light [1] | Medium [2] | Heavy [3] | Total |
| 0:00-0:59 | 7 | 0 | 0 | 7 | No Surveys Taken | | | | Not Applicable | | | | Not Applicable | | | | 2 | 0 | 1 | 3 |
| 1:00-1:59 | 0 | 0 | 0 | 0 | No Surveys Taken | | | | Not Applicable | | | | Not Applicable | | | | 2 | 0 | 0 | 2 |
| 2:00-2:59 | 3 | 0 | 0 | 3 | No Surveys Taken | | | | Not Applicable | | | | Not Applicable | | | | 12 | 0 | 0 | 12 |
| 3:00-3:59 | 1 | 0 | 0 | 1 | No Surveys Taken | | | | Not Applicable | | | | Not Applicable | | | | 26 | 0 | 0 | 26 |
| 4:00-4:59 | 1 | 0 | 0 | 1 | No Surveys Taken | | | | Not Applicable | | | | Not Applicable | | | | 57 | 0 | 0 | 57 |
| 5:00-5:59 | 11 | 1 | 1 | 13 | No Surveys Taken | | | | Not Applicable | | | | Not Applicable | | | | 98 | 3 | 0 | 101 |
| 6:00-6:59 | 30 | 4 | 1 | 35 | No Surveys Taken | | | | Not Applicable | | | | Not Applicable | | | | 69 | 4 | 1 | 74 |
| 7:00-7:59 | 47 | 2 | 2 | 51 | No Surveys Taken | | | | Not Applicable | | | | Not Applicable | | | | 57 | 1 | 0 | 58 |
| 8:00-8:59 | 49 | 2 | 2 | 53 | No Surveys Taken | | | | Not Applicable | | | | Not Applicable | | | | 46 | 2 | 0 | 48 |
| 9:00-9:59 | 63 | 3 | 2 | 68 | No Surveys Taken | | | | Not Applicable | | | | Not Applicable | | | | 35 | 2 | 1 | 38 |
| 10:00-10:59 | 91 | 2 | 3 | 96 | No Surveys Taken | | | | Not Applicable | | | | Not Applicable | | | | 54 | 3 | 1 | 58 |
| 11:00-11:59 | 71 | 2 | 2 | 75 | No Surveys Taken | | | | Not Applicable | | | | Not Applicable | | | | 75 | 0 | 2 | 77 |
| 12:00-12:59 | 65 | 5 | 5 | 75 | No Surveys Taken | | | | Not Applicable | | | | Not Applicable | | | | 86 | 4 | 1 | 91 |
| 13:00-13:59 | 71 | 2 | 0 | 73 | No Surveys Taken | | | | Not Applicable | | | | Not Applicable | | | | 90 | 0 | 1 | 91 |
| 14:00-14:59 | 91 | 1 | 3 | 95 | No Surveys Taken | | | | Not Applicable | | | | Not Applicable | | | | 80 | 2 | 1 | 83 |
| 15:00-15:59 | 95 | 1 | 1 | 97 | No Surveys Taken | | | | Not Applicable | | | | Not Applicable | | | | 69 | 2 | 2 | 73 |
| 16:00-16:59 | 103 | 1 | 4 | 108 | No Surveys Taken | | | | Not Applicable | | | | Not Applicable | | | | 84 | 0 | 2 | 86 |
| 17:00-17:59 | 81 | 3 | 1 | 85 | No Surveys Taken | | | | Not Applicable | | | | Not Applicable | | | | 50 | 0 | 1 | 51 |
| 18:00-18:59 | 66 | 0 | 2 | 68 | No Surveys Taken | | | | Not Applicable | | | | Not Applicable | | | | 18 | 2 | 0 | 20 |
| 19:00-19:59 | 51 | 2 | 0 | 53 | No Surveys Taken | | | | Not Applicable | | | | Not Applicable | | | | 8 | 0 | 1 | 9 |
| 20:00-20:59 | 44 | 0 | 0 | 44 | No Surveys Taken | | | | Not Applicable | | | | Not Applicable | | | | 16 | 0 | 1 | 17 |
| 21:00-21:59 | 31 | 0 | 0 | 31 | No Surveys Taken | | | | Not Applicable | | | | Not Applicable | | | | 5 | 0 | 0 | 5 |
| 22:00-22:59 | 16 | 0 | 0 | 16 | No Surveys Taken | | | | Not Applicable | | | | Not Applicable | | | | 2 | 0 | 0 | 2 |
| 23:00-23:59 | 8 | 0 | 0 | 8 | No Surveys Taken | | | | Not Applicable | | | | Not Applicable | | | | 4 | 0 | 0 | 4 |
| **TOTALS** | 1096 | 31 | 29 | **1156** | 0 | 0 | 0 | **0** | 0.0% | 0.0% | 0.0% | 0.0% | n/a | n/a | n/a | n/a | 1045 | 25 | 16 | **1086** |
| Percentages | 94.8% | 2.7% | 2.5% | 100.0% | n/a | n/a | n/a | n/a | | | | | | | | | 96.2% | 2.3% | 1.5% | 100.0% |
| **Proportion of Daily Traffic During Survey Period** | | | | | | | | | | | | | | | | | | | | |
| Volume | 857 | 28 | 26 | **911** | | | | | | | | | | | | | 795 | 20 | 13 | **828** |
| Percentages | 78.2% | 90.3% | 89.7% | 78.8% | | | | | | | | | | | | | 76.1% | 80.0% | 81.3% | 76.2% |

[1] This includes Motorcycles, Cars & Trailers, plus 2 Axles long

[2] This includes Buses and Trucks with 2 thru 4 Axles

[3] This includes double or multi trailer trucks

[4] Confidence interval at 95% confidence level of a proporation of 0.50.

[5] Surveyed vehicles more than counted vehicles for this time period.

**Site 10**
**Site Location: U.S. 60 About 3 Miles Southeast of Goldfield Road**
**Survey Date: Wednesday, October 6, 1999**

| | Actual Volume (Direction of Survey-EB) | | | | Surveyed Trips (Direction of Survey-EB) | | | | Percentage of Volume Sampled (Direction of Survey-EB) | | | | Confidence Interval [4] (Direction of Survey-EB) | | | | Actual Volume (WB Direction) | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Time of Day | Light [1] | Medium [2] | Heavy [3] | Total | Light [1] | Medium [2] | Heavy [3] | Total | Light [1] | Medium [2] | Heavy [3] | Total | Light [1] | Medium [2] | Heavy [3] | Total | Light [1] | Medium [2] | Heavy [3] | Total |
| 0:00-0:59 | 88 | 2 | 10 | 100 | No Surveys Taken | | | | Not Applicable | | | | Not Applicable | | | | 51 | 0 | 16 | 67 |
| 1:00-1:59 | 35 | 3 | 9 | 47 | No Surveys Taken | | | | Not Applicable | | | | Not Applicable | | | | 24 | 0 | 16 | 40 |
| 2:00-2:59 | 18 | 2 | 11 | 31 | No Surveys Taken | | | | Not Applicable | | | | Not Applicable | | | | 27 | 2 | 11 | 40 |
| 3:00-3:59 | 64 | 0 | 12 | 76 | No Surveys Taken | | | | Not Applicable | | | | Not Applicable | | | | 55 | 1 | 18 | 74 |
| 4:00-4:59 | 164 | 7 | 17 | 188 | No Surveys Taken | | | | Not Applicable | | | | Not Applicable | | | | 235 | 10 | 23 | 268 |
| 5:00-5:59 | 397 | 16 | 23 | 436 | No Surveys Taken | | | | Not Applicable | | | | Not Applicable | | | | 541 | 16 | 24 | 581 |
| 6:00-6:59 | 527 | 23 | 45 | 595 | 0 | 0 | 0 | 0 | 0.0% | 0.0% | 0.0% | 0.0% | n/a | n/a | n/a | n/a | 731 | 30 | 48 | 809 |
| 7:00-7:59 | 600 | 28 | 49 | 677 | 72 | 3 | 1 | 76 | 12.0% | 10.7% | 2.0% | 11.2% | 0.11 | 0.54 | 0.98 | 0.11 | 726 | 25 | 54 | 805 |
| 8:00-8:59 | 548 | 14 | 30 | 592 | 85 | 7 | 4 | 96 | 15.5% | 50.0% | 13.3% | 16.2% | 0.10 | 0.27 | 0.46 | 0.09 | 811 | 44 | 61 | 916 |
| 9:00-9:59 | 488 | 11 | 35 | 534 | 60 | 7 | 1 | 68 | 12.3% | 63.6% | 2.9% | 12.7% | 0.12 | 0.23 | 0.98 | 0.11 | 954 | 30 | 57 | 1041 |
| 10:00-10:59 | 529 | 17 | 47 | 593 | 77 | 6 | 3 | 86 | 14.6% | 35.3% | 6.4% | 14.5% | 0.10 | 0.33 | 0.55 | 0.10 | 947 | 44 | 74 | 1065 |
| 11:00-11:59 | 573 | 21 | 42 | 636 | 92 | 2 | 4 | 98 | 16.1% | 9.5% | 9.5% | 15.4% | 0.09 | 0.68 | 0.47 | 0.09 | 863 | 42 | 71 | 976 |
| 12:00-12:59 | 553 | 24 | 34 | 611 | 83 | 5 | 5 | 93 | 15.0% | 20.8% | 14.7% | 15.2% | 0.10 | 0.40 | 0.41 | 0.09 | 860 | 45 | 81 | 986 |
| 13:00-13:59 | 624 | 11 | 30 | 665 | 86 | 3 | 1 | 90 | 13.8% | 27.3% | 3.3% | 13.5% | 0.10 | 0.51 | 0.98 | 0.10 | 944 | 45 | 62 | 1051 |
| 14:00-14:59 | 655 | 29 | 25 | 709 | 103 | 0 | 0 | 103 | 15.7% | 0.0% | 0.0% | 14.5% | 0.09 | n/a | n/a | 0.09 | 1006 | 40 | 73 | 1119 |
| 15:00-15:59 | 688 | 14 | 22 | 724 | 90 | 2 | 0 | 92 | 13.1% | 14.3% | 0.0% | 12.7% | 0.10 | 0.67 | n/a | 0.10 | 990 | 35 | 58 | 1083 |
| 16:00-16:59 | 705 | 11 | 12 | 728 | 104 | 0 | 0 | 104 | 14.8% | 0.0% | 0.0% | 14.3% | 0.09 | n/a | n/a | 0.09 | 972 | 23 | 56 | 1051 |
| 17:00-17:59 | 639 | 3 | 11 | 653 | 55 | 0 | 0 | 55 | 8.6% | 0.0% | 0.0% | 8.4% | 0.13 | n/a | n/a | 0.13 | 926 | 21 | 39 | 986 |
| 18:00-18:59 | 565 | 4 | 16 | 585 | No Surveys Taken | | | | Not Applicable | | | | Not Applicable | | | | 759 | 10 | 32 | 801 |
| 19:00-19:59 | 394 | 0 | 14 | 408 | No Surveys Taken | | | | Not Applicable | | | | Not Applicable | | | | 394 | 13 | 15 | 422 |
| 20:00-20:59 | 285 | 1 | 12 | 298 | No Surveys Taken | | | | Not Applicable | | | | Not Applicable | | | | 368 | 9 | 22 | 399 |
| 21:00-21:59 | 221 | 3 | 5 | 229 | No Surveys Taken | | | | Not Applicable | | | | Not Applicable | | | | 257 | 3 | 26 | 286 |
| 22:00-22:59 | 134 | 0 | 10 | 144 | No Surveys Taken | | | | Not Applicable | | | | Not Applicable | | | | 117 | 1 | 24 | 142 |
| 23:00-23:59 | 87 | 2 | 9 | 98 | No Surveys Taken | | | | Not Applicable | | | | Not Applicable | | | | 78 | 4 | 14 | 96 |
| **TOTALS** | 9581 | 246 | 530 | **10357** | 907 | 35 | 19 | **961** | 9.5% | 14.2% | 3.6% | 9.3% | 0.03 | 0.15 | 0.22 | 0.03 | 13636 | 493 | 975 | **15104** |
| Percentages | 92.5% | 2.4% | 5.1% | 100.0% | 90.0% | 0.0% | 0.0% | 100.0% | | | | | | | | | 90.3% | 3.3% | 6.5% | 100.0% |
| **Proportion of Daily Traffic During Survey Period** | | | | | | | | | | | | | | | | | | | | |
| Volume | 7129 | 206 | 382 | **7717** | | | | | | | | | | | | | 10730 | 424 | 734 | **11888** |
| Percentages | 74.4% | 83.7% | 72.1% | 74.5% | | | | | | | | | | | | | 78.7% | 86.0% | 75.3% | 78.7% |

[1] This includes Motorcycles, Cars & Trailers, plus 2 Axles long

[2] This includes Buses and Trucks with 2 thru 4 Axles

[3] This includes double or multi trailer trucks

[4] Confidence interval at 95% confidence level of a proporation of 0.50.

[5] Surveyed vehicles more than counted vehicles for this time period.

**Site 11**
**Site Location: Ocotillo Road East of Meridian Road**
**Survey Date: Wednesday, September 22, 1999**

| | Actual Volume (Direction of Survey-EB) | | | | Surveyed Trips (Direction of Survey-EB) | | | | Percentage of Volume Sampled (Direction of Survey-EB) | | | | Confidence Interval [4] (Direction of Survey-EB) | | | | Actual Volume (WB Direction) | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Time of Day | Light [1] | Medium [2] | Heavy [3] | Total | Light [1] | Medium [2] | Heavy [3] | Total | Light [1] | Medium [2] | Heavy [3] | Total | Light [1] | Medium [2] | Heavy [3] | Total | Light [1] | Medium [2] | Heavy [3] | Total |
| 0:00-0:59 | 3 | 0 | 0 | 3 | No Surveys Taken | | | | Not Applicable | | | | Not Applicable | | | | 13 | 0 | 0 | 13 |
| 1:00-1:59 | 4 | 0 | 2 | 6 | No Surveys Taken | | | | Not Applicable | | | | Not Applicable | | | | 7 | 0 | 0 | 7 |
| 2:00-2:59 | 3 | 0 | 1 | 4 | No Surveys Taken | | | | Not Applicable | | | | Not Applicable | | | | 2 | 0 | 0 | 2 |
| 3:00-3:59 | 12 | 0 | 1 | 13 | No Surveys Taken | | | | Not Applicable | | | | Not Applicable | | | | 6 | 6 | 0 | 12 |
| 4:00-4:59 | 40 | 3 | 3 | 46 | No Surveys Taken | | | | Not Applicable | | | | Not Applicable | | | | 8 | 3 | 1 | 12 |
| 5:00-5:59 | 99 | 2 | 2 | 103 | No Surveys Taken | | | | Not Applicable | | | | Not Applicable | | | | 26 | 8 | 6 | 40 |
| 6:00-6:59 | 123 | 3 | 10 | 136 | 0 | 0 | 0 | 0 | 0.0% | 0.0% | 0.0% | 0.0% | n/a | n/a | n/a | n/a | 38 | 3 | 11 | 52 |
| 7:00-7:59 | 153 | 7 | 11 | 171 | 12 | 1 | 1 | 14 | 7.8% | 14.3% | 9.1% | 8.2% | 0.27 | 0.98 | 0.98 | 0.25 | 42 | 8 | 7 | 57 |
| 8:00-8:59 | 102 | 2 | 14 | 118 | 22 | 1 | 1 | 24 | 21.6% | 50.0% | 7.1% | 20.3% | 0.19 | 0.98 | 0.98 | 0.18 | 71 | 12 | 6 | 89 |
| 9:00-9:59 | 77 | 4 | 11 | 92 | 18 | 1 | 1 | 20 | 23.4% | 25.0% | 9.1% | 21.7% | 0.20 | 0.98 | 0.98 | 0.19 | 44 | 13 | 7 | 64 |
| 10:00-10:59 | 71 | 7 | 6 | 84 | 17 | 0 | 0 | 17 | 23.9% | 0.0% | 0.0% | 20.2% | 0.21 | n/a | n/a | 0.21 | 46 | 10 | 7 | 63 |
| 11:00-11:59 | 70 | 1 | 13 | 84 | 19 | 1 | 1 | 21 | 27.1% | 100.0% | 7.7% | 25.0% | 0.19 | -- | 0.98 | 0.19 | 46 | 8 | 5 | 59 |
| 12:00-12:59 | 81 | 3 | 9 | 93 | 34 | 2 | 1 | 37 | 42.0% | 66.7% | 11.1% | 39.8% | 0.13 | 0.49 | 0.98 | 0.13 | 73 | 13 | 8 | 94 |
| 13:00-13:59 | 59 | 4 | 3 | 66 | 24 | 0 | 0 | 24 | 40.7% | 0.0% | 0.0% | 36.4% | 0.16 | n/a | n/a | 0.16 | 55 | 11 | 6 | 72 |
| 14:00-14:59 | 86 | 0 | 11 | 97 | 33 | 0 | 0 | 33 | 38.4% | -- | 0.0% | 34.0% | 0.13 | -- | n/a | 0.14 | 74 | 18 | 4 | 96 |
| 15:00-15:59 | 99 | 5 | 3 | 107 | 38 | 1 | 0 | 39 | 38.4% | 20.0% | 0.0% | 36.4% | 0.13 | 0.98 | n/a | 0.13 | 141 | 19 | 2 | 162 |
| 16:00-16:59 | 87 | 2 | 2 | 91 | 43 | 0 | 0 | 43 | 49.4% | 0.0% | 0.0% | 47.3% | 0.11 | n/a | n/a | 0.11 | 127 | 5 | 4 | 136 |
| 17:00-17:59 | 85 | 0 | 0 | 85 | 26 | 0 | 0 | 26 | 30.6% | -- | -- | 30.6% | 0.16 | -- | -- | 0.16 | 134 | 14 | 4 | 152 |
| 18:00-18:59 | 65 | 2 | 3 | 70 | No Surveys Taken | | | | Not Applicable | | | | Not Applicable | | | | 82 | 4 | 3 | 89 |
| 19:00-19:59 | 55 | 0 | 4 | 59 | No Surveys Taken | | | | Not Applicable | | | | Not Applicable | | | | 71 | 4 | 3 | 78 |
| 20:00-20:59 | 31 | 1 | 0 | 32 | No Surveys Taken | | | | Not Applicable | | | | Not Applicable | | | | 72 | 4 | 2 | 78 |
| 21:00-21:59 | 19 | 0 | 0 | 19 | No Surveys Taken | | | | Not Applicable | | | | Not Applicable | | | | 47 | 2 | 1 | 50 |
| 22:00-22:59 | 15 | 0 | 0 | 15 | No Surveys Taken | | | | Not Applicable | | | | Not Applicable | | | | 17 | 1 | 0 | 18 |
| 23:00-23:59 | 9 | 0 | 0 | 9 | No Surveys Taken | | | | Not Applicable | | | | Not Applicable | | | | 11 | 1 | 0 | 12 |
| **TOTALS** | 1448 | 46 | 109 | **1603** | 286 | 7 | 5 | **298** | 19.8% | 15.2% | 4.6% | 18.6% | 0.05 | 0.34 | 0.43 | 0.05 | 1253 | 167 | 87 | **1507** |
| Percentages | 90.3% | 2.9% | 6.8% | 100.0% | 100.0% | 0.0% | 0.0% | 100.0% | | | | | | | | | 83.1% | 11.1% | 5.8% | 100.0% |
| **Proportion of Daily Traffic During Survey Period** | | | | | | | | | | | | | | | | | | | | |
| Volume | 1093 | 38 | 93 | **1224** | | | | | | | | | | | | | 891 | 134 | 71 | **1096** |
| Percentages | 75.5% | 82.6% | 85.3% | 76.4% | | | | | | | | | | | | | 71.1% | 80.2% | 81.6% | 72.7% |

[1] This includes Motorcycles, Cars & Trailers, plus 2 Axles long

[2] This includes Buses and Trucks with 2 thru 4 Axles

[3] This includes double or multi trailer trucks

[4] Confidence interval at 95% confidence level of a proporation of 0.50.

[5] Surveyed vehicles more than counted vehicles for this time period.

**Site 12**
**Site Location: Rittenhouse Road at Combs Road**
**Survey Date: Tuesday, September 21, 1999**

| | Actual Volume (Direction of Survey-SB) | | | | Surveyed Trips (Direction of Survey-SB) | | | | Percentage of Volume Sampled (Direction of Survey-SB) | | | | Confidence Interval [4] (Direction of Survey-SB) | | | | Actual Volume (NB Direction) | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Time of Day | Light [1] | Medium [2] | Heavy [3] | Total | Light [1] | Medium [2] | Heavy [3] | Total | Light [1] | Medium [2] | Heavy [3] | Total | Light [1] | Medium [2] | Heavy [3] | Total | Light [1] | Medium [2] | Heavy [3] | Total |
| 0:00-0:59 | 8 | 0 | 0 | 8 | No Surveys Taken | | | | Not Applicable | | | | Not Applicable | | | | 3 | 0 | 0 | 3 |
| 1:00-1:59 | 6 | 2 | 0 | 8 | No Surveys Taken | | | | Not Applicable | | | | Not Applicable | | | | 5 | 0 | 0 | 5 |
| 2:00-2:59 | 3 | 0 | 1 | 4 | No Surveys Taken | | | | Not Applicable | | | | Not Applicable | | | | 3 | 2 | 0 | 5 |
| 3:00-3:59 | 11 | 0 | 0 | 11 | No Surveys Taken | | | | Not Applicable | | | | Not Applicable | | | | 4 | 0 | 0 | 4 |
| 4:00-4:59 | 12 | 0 | 2 | 14 | No Surveys Taken | | | | Not Applicable | | | | Not Applicable | | | | 20 | 1 | 3 | 24 |
| 5:00-5:59 | 24 | 1 | 1 | 26 | No Surveys Taken | | | | Not Applicable | | | | Not Applicable | | | | 76 | 9 | 8 | 93 |
| 6:00-6:59 | 34 | 6 | 3 | 43 | 5 | 1 | 0 | 6 | 14.7% | 16.7% | 0.0% | 14.0% | 0.41 | 0.98 | n/a | 0.38 | 66 | 6 | 8 | 80 |
| 7:00-7:59 | 37 | 14 | 1 | 52 | 11 | 7 | 1 | 19 | 29.7% | 50.0% | 100.0% | 36.5% | 0.25 | 0.27 | -- | 0.18 | 72 | 5 | 5 | 82 |
| 8:00-8:59 | 28 | 6 | 7 | 41 | 18 | 2 | 1 | 21 | 64.3% | 33.3% | 14.3% | 51.2% | 0.14 | 0.62 | 0.98 | 0.15 | 45 | 9 | 7 | 61 |
| 9:00-9:59 | 30 | 7 | 4 | 41 | 16 | 0 | 1 | 17 | 53.3% | 0.0% | 25.0% | 41.5% | 0.17 | n/a | 0.98 | 0.18 | 33 | 12 | 8 | 53 |
| 10:00-10:59 | 35 | 9 | 4 | 48 | 16 | 3 | 0 | 19 | 45.7% | 33.3% | 0.0% | 39.6% | 0.18 | 0.49 | n/a | 0.18 | 43 | 4 | 6 | 53 |
| 11:00-11:59 | 36 | 4 | 3 | 43 | 19 | 1 | 0 | 20 | 52.8% | 25.0% | 0.0% | 46.5% | 0.16 | 0.98 | n/a | 0.16 | 40 | 10 | 9 | 59 |
| 12:00-12:59 | 42 | 5 | 7 | 54 | 15 | 1 | 2 | 18 | 35.7% | 20.0% | 28.6% | 33.3% | 0.21 | 0.98 | 0.63 | 0.19 | 35 | 6 | 8 | 49 |
| 13:00-13:59 | 44 | 6 | 3 | 53 | 19 | 0 | 1 | 20 | 43.2% | 0.0% | 33.3% | 37.7% | 0.17 | n/a | 0.98 | 0.17 | 39 | 8 | 8 | 55 |
| 14:00-14:59 | 58 | 7 | 5 | 70 | 26 | 0 | 0 | 26 | 44.8% | 0.0% | 0.0% | 37.1% | 0.14 | n/a | n/a | 0.15 | 41 | 5 | 4 | 50 |
| 15:00-15:59 | 78 | 6 | 1 | 85 | 30 | 0 | 0 | 30 | 38.5% | 0.0% | 0.0% | 35.3% | 0.14 | n/a | -- | 0.14 | 48 | 5 | 2 | 55 |
| 16:00-16:59 | 85 | 3 | 4 | 92 | 33 | 0 | 0 | 33 | 38.8% | 0.0% | 0.0% | 35.9% | 0.13 | n/a | n/a | 0.14 | 50 | 1 | 2 | 53 |
| 17:00-17:59 | 64 | 0 | 0 | 64 | 13 | 0 | 0 | 13 | 20.3% | -- | -- | 20.3% | 0.24 | -- | -- | 0.24 | 51 | 1 | 1 | 53 |
| 18:00-18:59 | 57 | 1 | 5 | 63 | No Surveys Taken | | | | Not Applicable | | | | Not Applicable | | | | 29 | 0 | 1 | 30 |
| 19:00-19:59 | 50 | 0 | 0 | 50 | No Surveys Taken | | | | Not Applicable | | | | Not Applicable | | | | 22 | 0 | 2 | 24 |
| 20:00-20:59 | 25 | 0 | 0 | 25 | No Surveys Taken | | | | Not Applicable | | | | Not Applicable | | | | 16 | 0 | 0 | 16 |
| 21:00-21:59 | 23 | 0 | 0 | 23 | No Surveys Taken | | | | Not Applicable | | | | Not Applicable | | | | 9 | 0 | 0 | 9 |
| 22:00-22:59 | 17 | 0 | 0 | 17 | No Surveys Taken | | | | Not Applicable | | | | Not Applicable | | | | 5 | 0 | 0 | 5 |
| 23:00-23:59 | 9 | 0 | 0 | 9 | No Surveys Taken | | | | Not Applicable | | | | Not Applicable | | | | 7 | 0 | 0 | 7 |
| **TOTALS** | 816 | 77 | 51 | **944** | 221 | 15 | 6 | **242** | 27.1% | 19.5% | 11.8% | 25.6% | 0.06 | 0.23 | 0.38 | 0.05 | 762 | 84 | 82 | **928** |
| Percentages | 86.4% | 8.2% | 5.4% | 100.0% | 90.0% | 10.0% | 0.0% | 100.0% | | | | | | | | | 82.1% | 9.1% | 8.8% | 100.0% |
| **Proportion of Daily Traffic During Survey Period** | | | | | | | | | | | | | | | | | | | | |
| Volume | 571 | 73 | 42 | **686** | | | | | | | | | | | | | 563 | 72 | 68 | **703** |
| Percentages | 70.0% | 94.8% | 82.4% | 72.7% | | | | | | | | | | | | | 73.9% | 85.7% | 82.9% | 75.8% |

[1] This includes Motorcycles, Cars & Trailers, plus 2 Axles long

[2] This includes Buses and Trucks with 2 thru 4 Axles

[3] This includes double or multi trailer trucks

[4] Confidence interval at 95% confidence level of a proporation of 0.50.

[5] Surveyed vehicles more than counted vehicles for this time period.

**Site 13**
**Site Location: Hunt Highway 1.7 Miles East of Ellsworth Road**
**Survey Date: Tuesday, September 21, 1999**

| | Actual Volume (Direction of Survey-EB) | | | | Surveyed Trips (Direction of Survey-EB) | | | | Percentage of Volume Sampled (Direction of Survey-EB) | | | | Confidence Interval [4] (Direction of Survey-EB) | | | | Actual Volume (WB Direction) | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Time of Day | Light [1] | Medium [2] | Heavy [3] | Total | Light [1] | Medium [2] | Heavy [3] | Total | Light [1] | Medium [2] | Heavy [3] | Total | Light [1] | Medium [2] | Heavy [3] | Total | Light [1] | Medium [2] | Heavy [3] | Total |
| 0:00-0:59 | 12 | 0 | 1 | 13 | No Surveys Taken | | | | Not Applicable | | | | Not Applicable | | | | 2 | 0 | 0 | 2 |
| 1:00-1:59 | 4 | 1 | 2 | 7 | No Surveys Taken | | | | Not Applicable | | | | Not Applicable | | | | 0 | 1 | 0 | 1 |
| 2:00-2:59 | 3 | 0 | 0 | 3 | No Surveys Taken | | | | Not Applicable | | | | Not Applicable | | | | 4 | 1 | 1 | 6 |
| 3:00-3:59 | 3 | 0 | 0 | 3 | No Surveys Taken | | | | Not Applicable | | | | Not Applicable | | | | 12 | 0 | 1 | 13 |
| 4:00-4:59 | 14 | 2 | 4 | 20 | No Surveys Taken | | | | Not Applicable | | | | Not Applicable | | | | 27 | 3 | 1 | 31 |
| 5:00-5:59 | 71 | 3 | 3 | 77 | No Surveys Taken | | | | Not Applicable | | | | Not Applicable | | | | 71 | 7 | 2 | 80 |
| 6:00-6:59 | 83 | 7 | 9 | 99 | 0 | 0 | 0 | 0 | 0.0% | 0.0% | 0.0% | 0.0% | n/a | n/a | n/a | n/a | 72 | 4 | 7 | 83 |
| 7:00-7:59 | 95 | 5 | 4 | 104 | 10 | 4 | 0 | 14 | 10.5% | 80.0% | 0.0% | 13.5% | 0.29 | 0.25 | n/a | 0.24 | 95 | 18 | 7 | 120 |
| 8:00-8:59 | 65 | 8 | 4 | 77 | 22 | 10 | 0 | 32 | 33.8% | 125.0% | 0.0% | 41.6% | 0.17 | <5> | n/a | 0.13 | 58 | 13 | 4 | 75 |
| 9:00-9:59 | 52 | 6 | 4 | 62 | 30 | 3 | 0 | 33 | 57.7% | 50.0% | 0.0% | 53.2% | 0.12 | 0.44 | n/a | 0.12 | 55 | 19 | 7 | 81 |
| 10:00-10:59 | 56 | 4 | 1 | 61 | 22 | 2 | 3 | 27 | 39.3% | 50.0% | 300.0% | 44.3% | 0.16 | 0.57 | -- | 0.14 | 67 | 11 | 6 | 84 |
| 11:00-11:59 | 61 | 8 | 3 | 72 | 29 | 2 | 0 | 31 | 47.5% | 25.0% | 0.0% | 43.1% | 0.13 | 0.64 | n/a | 0.13 | 50 | 13 | 2 | 65 |
| 12:00-12:59 | 54 | 5 | 7 | 66 | 19 | 4 | 0 | 23 | 35.2% | 80.0% | 0.0% | 34.8% | 0.18 | 0.25 | n/a | 0.17 | 59 | 13 | 10 | 82 |
| 13:00-13:59 | 62 | 6 | 7 | 75 | 27 | 3 | 1 | 31 | 43.5% | 50.0% | 14.3% | 41.3% | 0.14 | 0.44 | 0.98 | 0.14 | 79 | 18 | 6 | 103 |
| 14:00-14:59 | 70 | 9 | 2 | 81 | 30 | 5 | 0 | 35 | 42.9% | 55.6% | 0.0% | 43.2% | 0.14 | 0.31 | n/a | 0.13 | 80 | 14 | 6 | 100 |
| 15:00-15:59 | 79 | 1 | 5 | 85 | 30 | 0 | 0 | 30 | 38.0% | 0.0% | 0.0% | 35.3% | 0.14 | -- | n/a | 0.14 | 91 | 15 | 6 | 112 |
| 16:00-16:59 | 80 | 1 | 3 | 84 | 38 | 0 | 0 | 38 | 47.5% | 0.0% | 0.0% | 45.2% | 0.12 | -- | n/a | 0.12 | 81 | 10 | 4 | 95 |
| 17:00-17:59 | 108 | 1 | 3 | 112 | 27 | 1 | 0 | 28 | 25.0% | 100.0% | 0.0% | 25.0% | 0.16 | -- | n/a | 0.16 | 71 | 7 | 2 | 80 |
| 18:00-18:59 | 59 | 0 | 1 | 60 | No Surveys Taken | | | | Not Applicable | | | | Not Applicable | | | | 57 | 6 | 1 | 64 |
| 19:00-19:59 | 50 | 2 | 0 | 52 | No Surveys Taken | | | | Not Applicable | | | | Not Applicable | | | | 32 | 2 | 5 | 39 |
| 20:00-20:59 | 46 | 0 | 1 | 47 | No Surveys Taken | | | | Not Applicable | | | | Not Applicable | | | | 17 | 2 | 1 | 20 |
| 21:00-21:59 | 28 | 0 | 0 | 28 | No Surveys Taken | | | | Not Applicable | | | | Not Applicable | | | | 21 | 1 | 1 | 23 |
| 22:00-22:59 | 20 | 0 | 0 | 20 | No Surveys Taken | | | | Not Applicable | | | | Not Applicable | | | | 5 | 0 | 0 | 5 |
| 23:00-23:59 | 4 | 0 | 0 | 4 | No Surveys Taken | | | | Not Applicable | | | | Not Applicable | | | | 4 | 0 | 0 | 4 |
| **TOTALS** | 1179 | 69 | 64 | **1312** | 284 | 34 | 4 | **322** | 24.1% | 49.3% | 6.3% | 24.5% | 0.05 | 0.12 | 0.48 | 0.05 | 1110 | 178 | 80 | **1368** |
| Percentages | 89.9% | 5.3% | 4.9% | 100.0% | 90.0% | 10.0% | 0.0% | 100.0% | | | | | | | | | 81.1% | 13.0% | 5.8% | 100.0% |
| **Proportion of Daily Traffic During Survey Period** | | | | | | | | | | | | | | | | | | | | |
| Volume | 865 | 61 | 52 | **978** | | | | | | | | | | | | | 858 | 155 | 67 | **1080** |
| Percentages | 73.4% | 88.4% | 81.3% | 74.5% | | | | | | | | | | | | | 77.3% | 87.1% | 83.8% | 78.9% |

[1] This includes Motorcycles, Cars & Trailers, plus 2 Axles long

[2] This includes Buses and Trucks with 2 thru 4 Axles

[3] This includes double or multi trailer trucks

[4] Confidence interval at 95% confidence level of a proporation of 0.50.

[5] Surveyed vehicles more than counted vehicles for this time period.

**Site 14**
**Site Location: Gilbert Road South of Hunt Highway (Counts Only)**
**Survey Date: Thursday, October 21, 1999**

| | Actual Volume (Direction of Survey-SB) | | | | Surveyed Trips (Direction of Survey-SB) | | | | Percentage of Volume Sampled (Direction of Survey-SB) | | | | Confidence Interval [4] (Direction of Survey-SB) | | | | Actual Volume (NB Direction) | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Time of Day | Light [1] | Medium [2] | Heavy [3] | Total | Light [1] | Medium [2] | Heavy [3] | Total | Light [1] | Medium [2] | Heavy [3] | Total | Light [1] | Medium [2] | Heavy [3] | Total | Light [1] | Medium [2] | Heavy [3] | Total |
| 0:00-0:59 | 9 | 0 | 0 | 9 | No Surveys Taken | | | | Not Applicable | | | | Not Applicable | | | | 6 | 0 | 0 | 6 |
| 1:00-1:59 | 5 | 0 | 0 | 5 | No Surveys Taken | | | | Not Applicable | | | | Not Applicable | | | | 2 | 1 | 0 | 3 |
| 2:00-2:59 | 0 | 0 | 0 | 0 | No Surveys Taken | | | | Not Applicable | | | | Not Applicable | | | | 2 | 0 | 0 | 2 |
| 3:00-3:59 | 3 | 0 | 0 | 3 | No Surveys Taken | | | | Not Applicable | | | | Not Applicable | | | | 7 | 0 | 0 | 7 |
| 4:00-4:59 | 17 | 2 | 6 | 25 | No Surveys Taken | | | | Not Applicable | | | | Not Applicable | | | | 11 | 0 | 0 | 11 |
| 5:00-5:59 | 44 | 3 | 11 | 58 | No Surveys Taken | | | | Not Applicable | | | | Not Applicable | | | | 32 | 1 | 5 | 38 |
| 6:00-6:59 | 96 | 7 | 5 | 108 | No Surveys Taken | | | | Not Applicable | | | | Not Applicable | | | | 40 | 7 | 6 | 53 |
| 7:00-7:59 | 141 | 5 | 11 | 157 | No Surveys Taken | | | | Not Applicable | | | | Not Applicable | | | | 47 | 7 | 6 | 60 |
| 8:00-8:59 | 55 | 4 | 4 | 63 | No Surveys Taken | | | | Not Applicable | | | | Not Applicable | | | | 43 | 7 | 8 | 58 |
| 9:00-9:59 | 40 | 2 | 13 | 55 | No Surveys Taken | | | | Not Applicable | | | | Not Applicable | | | | 24 | 7 | 13 | 44 |
| 10:00-10:59 | 39 | 6 | 12 | 57 | No Surveys Taken | | | | Not Applicable | | | | Not Applicable | | | | 44 | 7 | 9 | 60 |
| 11:00-11:59 | 33 | 6 | 10 | 49 | No Surveys Taken | | | | Not Applicable | | | | Not Applicable | | | | 46 | 11 | 8 | 65 |
| 12:00-12:59 | 37 | 8 | 11 | 56 | No Surveys Taken | | | | Not Applicable | | | | Not Applicable | | | | 40 | 5 | 5 | 50 |
| 13:00-13:59 | 35 | 2 | 6 | 43 | No Surveys Taken | | | | Not Applicable | | | | Not Applicable | | | | 56 | 1 | 12 | 69 |
| 14:00-14:59 | 41 | 5 | 4 | 50 | No Surveys Taken | | | | Not Applicable | | | | Not Applicable | | | | 48 | 6 | 7 | 61 |
| 15:00-15:59 | 71 | 2 | 1 | 74 | No Surveys Taken | | | | Not Applicable | | | | Not Applicable | | | | 90 | 9 | 4 | 103 |
| 16:00-16:59 | 70 | 2 | 1 | 73 | No Surveys Taken | | | | Not Applicable | | | | Not Applicable | | | | 86 | 8 | 1 | 95 |
| 17:00-17:59 | 35 | 0 | 1 | 36 | No Surveys Taken | | | | Not Applicable | | | | Not Applicable | | | | 114 | 9 | 2 | 125 |
| 18:00-18:59 | 32 | 1 | 3 | 36 | No Surveys Taken | | | | Not Applicable | | | | Not Applicable | | | | 55 | 8 | 3 | 66 |
| 19:00-19:59 | 24 | 0 | 0 | 24 | No Surveys Taken | | | | Not Applicable | | | | Not Applicable | | | | 29 | 1 | 3 | 33 |
| 20:00-20:59 | 19 | 0 | 1 | 20 | No Surveys Taken | | | | Not Applicable | | | | Not Applicable | | | | 15 | 2 | 1 | 18 |
| 21:00-21:59 | 10 | 0 | 0 | 10 | No Surveys Taken | | | | Not Applicable | | | | Not Applicable | | | | 18 | 2 | 0 | 20 |
| 22:00-22:59 | 10 | 0 | 0 | 10 | No Surveys Taken | | | | Not Applicable | | | | Not Applicable | | | | 11 | 2 | 0 | 13 |
| 23:00-23:59 | 8 | 0 | 0 | 8 | No Surveys Taken | | | | Not Applicable | | | | Not Applicable | | | | 5 | 1 | 0 | 6 |
| **TOTALS** | 874 | 55 | 100 | **1029** | 0 | 0 | 0 | **0** | 0.0% | 0.0% | 0.0% | 0.0% | n/a | n/a | n/a | n/a | 871 | 102 | 93 | **1066** |
| Percentages | 84.9% | 5.3% | 9.7% | 100.0% | n/a | n/a | n/a | n/a | | | | | | | | | 81.7% | 9.6% | 8.7% | 100.0% |
| **Proportion of Daily Traffic During Survey Period** | | | | | | | | | | | | | | | | | | | | |
| Volume | 693 | 49 | 79 | **821** | | | | | | | | | | | | | 678 | 84 | 81 | **843** |
| Percentages | 79.3% | 89.1% | 79.0% | 79.8% | | | | | | | | | | | | | 77.8% | 82.4% | 87.1% | 79.1% |

[1] This includes Motorcycles, Cars & Trailers, plus 2 Axles long

[2] This includes Buses and Trucks with 2 thru 4 Axles

[3] This includes double or multi trailer trucks

[4] Confidence interval at 95% confidence level of a proporation of 0.50.

[5] Surveyed vehicles more than counted vehicles for this time period.

**Site 15**
**Site Location: SR 87 at SR 87/SR 587 Junction**
**Survey Date: Wednesday, September 22, 1999**

| | Actual Volume (Direction of Survey-SB) | | | | Surveyed Trips (Direction of Survey-SB) | | | | Percentage of Volume Sampled (Direction of Survey-SB) | | | | Confidence Interval [4] (Direction of Survey-SB) | | | | Actual Volume (NB Direction) | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Time of Day | Light [1] | Medium [2] | Heavy [3] | Total | Light [1] | Medium [2] | Heavy [3] | Total | Light [1] | Medium [2] | Heavy [3] | Total | Light [1] | Medium [2] | Heavy [3] | Total | Light [1] | Medium [2] | Heavy [3] | Total |
| 0:00-0:59 | 33 | 0 | 1 | 34 | No Surveys Taken | | | | Not Applicable | | | | Not Applicable | | | | 38 | 0 | 0 | 38 |
| 1:00-1:59 | 19 | 0 | 0 | 19 | No Surveys Taken | | | | Not Applicable | | | | Not Applicable | | | | 30 | 0 | 1 | 31 |
| 2:00-2:59 | 18 | 0 | 2 | 20 | No Surveys Taken | | | | Not Applicable | | | | Not Applicable | | | | 14 | 0 | 3 | 17 |
| 3:00-3:59 | 39 | 0 | 3 | 42 | No Surveys Taken | | | | Not Applicable | | | | Not Applicable | | | | 25 | 2 | 3 | 30 |
| 4:00-4:59 | 92 | 0 | 8 | 100 | No Surveys Taken | | | | Not Applicable | | | | Not Applicable | | | | 56 | 3 | 9 | 68 |
| 5:00-5:59 | 277 | 19 | 25 | 321 | No Surveys Taken | | | | Not Applicable | | | | Not Applicable | | | | 188 | 9 | 16 | 213 |
| 6:00-6:59 | 372 | 38 | 30 | 440 | 0 | 0 | 0 | 0 | 0.0% | 0.0% | 0.0% | 0.0% | n/a | n/a | n/a | n/a | 208 | 12 | 13 | 233 |
| 7:00-7:59 | 412 | 33 | 42 | 487 | 51 | 1 | 0 | 52 | 12.4% | 3.0% | 0.0% | 10.7% | 0.13 | 0.98 | n/a | 0.13 | 230 | 13 | 26 | 269 |
| 8:00-8:59 | 271 | 27 | 47 | 345 | 39 | 2 | 3 | 44 | 14.4% | 7.4% | 6.4% | 12.8% | 0.15 | 0.68 | 0.55 | 0.14 | 225 | 14 | 32 | 271 |
| 9:00-9:59 | 210 | 33 | 43 | 286 | 37 | 0 | 2 | 39 | 17.6% | 0.0% | 4.7% | 13.6% | 0.15 | n/a | 0.68 | 0.15 | 199 | 10 | 20 | 229 |
| 10:00-10:59 | 177 | 23 | 29 | 229 | 37 | 1 | 0 | 38 | 20.9% | 4.3% | 0.0% | 16.6% | 0.14 | 0.98 | n/a | 0.15 | 175 | 11 | 28 | 214 |
| 11:00-11:59 | 241 | 35 | 34 | 310 | 45 | 1 | 1 | 47 | 18.7% | 2.9% | 2.9% | 15.2% | 0.13 | 0.98 | 0.98 | 0.13 | 202 | 11 | 32 | 245 |
| 12:00-12:59 | 199 | 26 | 25 | 250 | 29 | 1 | 2 | 32 | 14.6% | 3.8% | 8.0% | 12.8% | 0.17 | 0.98 | 0.68 | 0.16 | 257 | 12 | 33 | 302 |
| 13:00-13:59 | 262 | 37 | 30 | 329 | 29 | 0 | 1 | 30 | 11.1% | 0.0% | 3.3% | 9.1% | 0.17 | n/a | 0.98 | 0.17 | 228 | 6 | 30 | 264 |
| 14:00-14:59 | 356 | 30 | 14 | 400 | 67 | 0 | 1 | 68 | 18.8% | 0.0% | 7.1% | 17.0% | 0.11 | n/a | 0.98 | 0.11 | 254 | 14 | 22 | 290 |
| 15:00-15:59 | 321 | 21 | 11 | 353 | 46 | 0 | 0 | 46 | 14.3% | 0.0% | 0.0% | 13.0% | 0.13 | n/a | n/a | 0.13 | 323 | 7 | 12 | 342 |
| 16:00-16:59 | 297 | 7 | 7 | 311 | 57 | 0 | 0 | 57 | 19.2% | 0.0% | 0.0% | 18.3% | 0.12 | n/a | n/a | 0.12 | 369 | 9 | 12 | 390 |
| 17:00-17:59 | 260 | 3 | 9 | 272 | 22 | 0 | 0 | 22 | 8.5% | 0.0% | 0.0% | 8.1% | 0.20 | n/a | n/a | 0.20 | 437 | 4 | 5 | 446 |
| 18:00-18:59 | 207 | 8 | 5 | 220 | No Surveys Taken | | | | Not Applicable | | | | Not Applicable | | | | 318 | 8 | 1 | 327 |
| 19:00-19:59 | 145 | 2 | 3 | 150 | No Surveys Taken | | | | Not Applicable | | | | Not Applicable | | | | 178 | 1 | 6 | 185 |
| 20:00-20:59 | 141 | 2 | 2 | 145 | No Surveys Taken | | | | Not Applicable | | | | Not Applicable | | | | 101 | 3 | 2 | 106 |
| 21:00-21:59 | 122 | 1 | 0 | 123 | No Surveys Taken | | | | Not Applicable | | | | Not Applicable | | | | 113 | 6 | 0 | 119 |
| 22:00-22:59 | 81 | 0 | 0 | 81 | No Surveys Taken | | | | Not Applicable | | | | Not Applicable | | | | 76 | 0 | 0 | 76 |
| 23:00-23:59 | 50 | 0 | 2 | 52 | No Surveys Taken | | | | Not Applicable | | | | Not Applicable | | | | 48 | 0 | 0 | 48 |
| **TOTALS** | 4602 | 345 | 372 | **5319** | 459 | 6 | 10 | **475** | 10.0% | 1.7% | 2.7% | 8.9% | 0.04 | 0.40 | 0.31 | 0.04 | 4292 | 155 | 306 | **4753** |
| Percentages | 86.5% | 6.5% | 7.0% | 100.0% | 100.0% | 0.0% | 0.0% | 100.0% | | | | | | | | | 90.3% | 3.3% | 6.4% | 100.0% |
| **Proportion of Daily Traffic During Survey Period** | | | | | | | | | | | | | | | | | | | | |
| Volume | 3378 | 313 | 321 | **4012** | | | | | | | | | | | | | 3107 | 123 | 265 | **3495** |
| Percentages | 73.4% | 90.7% | 86.3% | 75.4% | | | | | | | | | | | | | 72.4% | 79.4% | 86.6% | 73.5% |

[1] This includes Motorcycles, Cars & Trailers, plus 2 Axles long

[2] This includes Buses and Trucks with 2 thru 4 Axles

[3] This includes double or multi trailer trucks

[4] Confidence interval at 95% confidence level of a proporation of 0.50.

[5] Surveyed vehicles more than counted vehicles for this time period.

**Site 16**
**Site Location: I-10 South of Hunt Highway**
**Survey Date: Tuesday, October 12, 1999**

| | Actual Volume (Direction of Survey-SB) | | | | Surveyed Trips (Direction of Survey-SB) | | | | Percentage of Volume Sampled (Direction of Survey-SB) | | | | Confidence Interval [4] (Direction of Survey-SB) | | | | Actual Volume (NB Direction) | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Time of Day [6] | Light [1] | Medium [2] | Heavy [3] | Total | Light [1] | Medium [2] | Heavy [3] | Total | Light [1] | Medium [2] | Heavy [3] | Total | Light [1] | Medium [2] | Heavy [3] | Total | Light [1] | Medium [2] | Heavy [3] | Total |
| 7:00-7:59 | 464 | 25 | 109 | 598 | 21 | 1 | 3 | 25 | 4.5% | 4.0% | 2.8% | 4.2% | 0.21 | 0.98 | 0.56 | 0.19 | 758 | 30 | 138 | 926 |
| 8:00-8:59 | 1035 | 53 | 189 | 1277 | 75 | 3 | 5 | 83 | 7.2% | 5.7% | 2.6% | 6.5% | 0.11 | 0.55 | 0.43 | 0.10 | 764 | 19 | 158 | 941 |
| 9:00-9:59 | 945 | 30 | 241 | 1216 | 63 | 2 | 9 | 74 | 6.7% | 6.7% | 3.7% | 6.1% | 0.12 | 0.68 | 0.32 | 0.11 | 854 | 30 | 182 | 1066 |
| 10:00-10:59 | 942 | 43 | 299 | 1284 | 77 | 10 | 0 | 87 | 8.2% | 23.3% | 0.0% | 6.8% | 0.11 | 0.27 | n/a | 0.10 | 865 | 33 | 213 | 1111 |
| 11:00-11:59 | 814 | 34 | 302 | 1150 | 58 | 1 | 5 | 64 | 7.1% | 2.9% | 1.7% | 5.6% | 0.12 | 0.98 | 0.44 | 0.12 | 825 | 53 | 221 | 1099 |
| 12:00-12:59 | 802 | 21 | 260 | 1083 | 47 | 0 | 1 | 48 | 5.9% | 0.0% | 0.4% | 4.4% | 0.14 | n/a | 0.98 | 0.14 | 849 | 42 | 228 | 1119 |
| 13:00-13:59 | 759 | 45 | 239 | 1043 | 60 | 0 | 5 | 65 | 7.9% | 0.0% | 2.1% | 6.2% | 0.12 | n/a | 0.43 | 0.12 | 862 | 39 | 209 | 1110 |
| 14:00-14:59 | 901 | 32 | 207 | 1140 | 45 | 0 | 3 | 48 | 5.0% | 0.0% | 1.4% | 4.2% | 0.14 | n/a | 0.56 | 0.14 | 863 | 40 | 208 | 1111 |
| 15:00-15:59 | 932 | 35 | 198 | 1165 | 85 | 1 | 2 | 88 | 9.1% | 2.9% | 1.0% | 7.6% | 0.10 | 0.98 | 0.69 | 0.10 | 1002 | 40 | 221 | 1263 |
| 16:00-16:59 | 1047 | 30 | 178 | 1255 | 54 | 0 | 0 | 54 | 5.2% | 0.0% | 0.0% | 4.3% | 0.13 | n/a | n/a | 0.13 | 1141 | 54 | 215 | 1410 |
| 17:00-17:59 | 1089 | 31 | 142 | 1262 | 41 | 0 | 0 | 41 | 3.8% | 0.0% | 0.0% | 3.2% | 0.15 | n/a | n/a | 0.15 | 1264 | 37 | 164 | 1465 |
| 18:00-18:59 | 822 | 23 | 147 | 992 | No Surveys Taken | | | | Not Applicable | | | | Not Applicable | | | | 1229 | 33 | 152 | 1414 |
| 19:00-19:59 | 692 | 18 | 161 | 871 | No Surveys Taken | | | | Not Applicable | | | | Not Applicable | | | | 833 | 19 | 148 | 1000 |
| 20:00-20:59 | 538 | 10 | 129 | 677 | No Surveys Taken | | | | Not Applicable | | | | Not Applicable | | | | 553 | 20 | 156 | 729 |
| 21:00-21:59 | 427 | 20 | 137 | 584 | No Surveys Taken | | | | Not Applicable | | | | Not Applicable | | | | 446 | 5 | 142 | 593 |
| 22:00-22:59 | 400 | 13 | 159 | 572 | No Surveys Taken | | | | Not Applicable | | | | Not Applicable | | | | 334 | 16 | 141 | 491 |
| 23:00-23:59 | 371 | 8 | 143 | 522 | No Surveys Taken | | | | Not Applicable | | | | Not Applicable | | | | 249 | 6 | 135 | 390 |
| 0:00-0:59 | 585 | 15 | 130 | 730 | No Surveys Taken | | | | Not Applicable | | | | Not Applicable | | | | 171 | 4 | 89 | 264 |
| 1:00-1:59 | 161 | 10 | 122 | 293 | No Surveys Taken | | | | Not Applicable | | | | Not Applicable | | | | 95 | 10 | 97 | 202 |
| 2:00-2:59 | 71 | 19 | 141 | 231 | No Surveys Taken | | | | Not Applicable | | | | Not Applicable | | | | 63 | 9 | 89 | 161 |
| 3:00-3:59 | 65 | 9 | 132 | 206 | No Surveys Taken | | | | Not Applicable | | | | Not Applicable | | | | 54 | 3 | 75 | 132 |
| 4:00-4:59 | 87 | 9 | 153 | 249 | No Surveys Taken | | | | Not Applicable | | | | Not Applicable | | | | 88 | 4 | 116 | 208 |
| 5:00-5:59 | 201 | 25 | 176 | 402 | No Surveys Taken | | | | Not Applicable | | | | Not Applicable | | | | 301 | 16 | 126 | 443 |
| 6:00-6:59 | 439 | 36 | 188 | 663 | 0 | 0 | 0 | 0 | 0.0% | 0.0% | 0.0% | 0.0% | n/a | n/a | n/a | n/a | 529 | 22 | 144 | 695 |
| **TOTALS** | 14589 | 594 | 4282 | **19465** | 626 | 18 | 33 | **677** | 4.3% | 3.0% | 0.8% | 3.5% | 0.04 | 0.23 | 0.17 | 0.04 | 14992 | 584 | 3767 | **19343** |
| Percentages | 74.9% | 3.1% | 22.0% | 100.0% | 90.0% | 0.0% | 0.0% | 100.0% | | | | | | | | | 77.5% | 3.0% | 19.5% | 100.0% |
| **Proportion of Daily Traffic During Survey Period** | | | | | | | | | | | | | | | | | | | | |
| Volume | 10169 | 415 | 2552 | 13136 | | | | | | | | | | | | | 10576 | 439 | 2301 | 13316 |
| Percentages | 69.7% | 69.9% | 59.6% | 67.5% | | | | | | | | | | | | | 70.5% | 75.2% | 61.1% | 68.8% |

[1] This includes Motorcycles, Cars & Trailers, plus 2 Axles long

[2] This includes Buses and Trucks with 2 thru 4 Axles

[3] This includes double or multi trailer trucks

[4] Confidence interval at 95% confidence level of a proporation of 0.50.

[5] Surveyed vehicles more than counted vehicles for this time period.

[6] Counts are from 10/12, 7:00 AM through 10/13, 6:59 AM

**Site 17**
**Site Location: SR 347/Maricopa Road South of Hunt Highway**
**Survey Date: Wednesday, September 29, 1999**

| | Actual Volume (Direction of Survey-SB) | | | | Surveyed Trips (Direction of Survey-SB) | | | | Percentage of Volume Sampled (Direction of Survey-SB) | | | | Confidence Interval [4] (Direction of Survey-SB) | | | | Actual Volume [6] (NB Direction) | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Time of Day | Light [1] | Medium [2] | Heavy [3] | Total | Light [1] | Medium [2] | Heavy [3] | Total | Light [1] | Medium [2] | Heavy [3] | Total | Light [1] | Medium [2] | Heavy [3] | Total | Light [1] | Medium [2] | Heavy [3] | Total |
| 0:00-0:59 | 50 | 0 | 22 | 72 | No Surveys Taken | | | | Not Applicable | | | | Not Applicable | | | | 90 | 4 | 28 | 122 |
| 1:00-1:59 | 29 | 0 | 21 | 50 | No Surveys Taken | | | | Not Applicable | | | | Not Applicable | | | | 39 | 1 | 14 | 54 |
| 2:00-2:59 | 25 | 1 | 9 | 35 | No Surveys Taken | | | | Not Applicable | | | | Not Applicable | | | | 43 | 6 | 9 | 58 |
| 3:00-3:59 | 31 | 0 | 14 | 45 | No Surveys Taken | | | | Not Applicable | | | | Not Applicable | | | | 44 | 6 | 10 | 60 |
| 4:00-4:59 | 76 | 0 | 23 | 99 | No Surveys Taken | | | | Not Applicable | | | | Not Applicable | | | | 113 | 9 | 16 | 138 |
| 5:00-5:59 | 167 | 8 | 27 | 202 | No Surveys Taken | | | | Not Applicable | | | | Not Applicable | | | | 262 | 15 | 36 | 313 |
| 6:00-6:59 | 233 | 22 | 33 | 288 | 9 | 0 | 1 | 10 | 3.9% | 0.0% | 3.0% | 3.5% | 0.32 | n/a | 0.98 | 0.31 | 267 | 26 | 37 | 330 |
| 7:00-7:59 | 229 | 15 | 39 | 283 | 25 | 2 | 0 | 27 | 10.9% | 13.3% | 0.0% | 9.5% | 0.19 | 0.67 | n/a | 0.18 | 250 | 26 | 37 | 313 |
| 8:00-8:59 | 157 | 20 | 28 | 205 | 44 | 0 | 0 | 44 | 28.0% | 0.0% | 0.0% | 21.5% | 0.13 | n/a | n/a | 0.13 | 187 | 36 | 55 | 278 |
| 9:00-9:59 | 163 | 27 | 52 | 242 | 39 | 1 | 0 | 40 | 23.9% | 3.7% | 0.0% | 16.5% | 0.14 | 0.98 | n/a | 0.14 | 157 | 25 | 47 | 229 |
| 10:00-10:59 | 182 | 23 | 47 | 252 | 28 | 2 | 0 | 30 | 15.4% | 8.7% | 0.0% | 11.9% | 0.17 | 0.68 | n/a | 0.17 | 182 | 34 | 43 | 259 |
| 11:00-11:59 | 148 | 24 | 35 | 207 | 33 | 0 | 0 | 33 | 22.3% | 0.0% | 0.0% | 15.9% | 0.15 | n/a | n/a | 0.16 | 188 | 25 | 51 | 264 |
| 12:00-12:59 | 169 | 27 | 43 | 239 | 40 | 0 | 1 | 41 | 23.7% | 0.0% | 2.3% | 17.2% | 0.14 | n/a | 0.98 | 0.14 | 167 | 25 | 46 | 238 |
| 13:00-13:59 | 183 | 24 | 36 | 243 | 56 | 1 | 0 | 57 | 30.6% | 4.2% | 0.0% | 23.5% | 0.11 | 0.98 | n/a | 0.11 | 227 | 23 | 51 | 301 |
| 14:00-14:59 | 249 | 23 | 37 | 309 | 45 | 0 | 0 | 45 | 18.1% | 0.0% | 0.0% | 14.6% | 0.13 | n/a | n/a | 0.14 | 246 | 30 | 57 | 333 |
| 15:00-15:59 | 304 | 15 | 42 | 361 | 47 | 1 | 0 | 48 | 15.5% | 6.7% | 0.0% | 13.3% | 0.13 | 0.98 | n/a | 0.13 | 297 | 14 | 47 | 358 |
| 16:00-16:59 | 313 | 15 | 32 | 360 | 54 | 0 | 0 | 54 | 17.3% | 0.0% | 0.0% | 15.0% | 0.12 | n/a | n/a | 0.12 | 311 | 11 | 36 | 358 |
| 17:00-17:59 | 324 | 6 | 27 | 357 | 35 | 0 | 0 | 35 | 10.8% | 0.0% | 0.0% | 9.8% | 0.16 | n/a | n/a | 0.16 | 269 | 8 | 25 | 302 |
| 18:00-18:59 | 236 | 4 | 29 | 269 | No Surveys Taken | | | | Not Applicable | | | | Not Applicable | | | | 173 | 5 | 21 | 199 |
| 19:00-19:59 | 136 | 3 | 24 | 163 | No Surveys Taken | | | | Not Applicable | | | | Not Applicable | | | | 112 | 2 | 19 | 133 |
| 20:00-20:59 | 100 | 1 | 29 | 130 | No Surveys Taken | | | | Not Applicable | | | | Not Applicable | | | | 120 | 1 | 25 | 146 |
| 21:00-21:59 | 104 | 2 | 32 | 138 | No Surveys Taken | | | | Not Applicable | | | | Not Applicable | | | | 178 | 6 | 27 | 211 |
| 22:00-22:59 | 82 | 1 | 23 | 106 | No Surveys Taken | | | | Not Applicable | | | | Not Applicable | | | | 178 | 3 | 31 | 212 |
| 23:00-23:59 | 63 | 0 | 23 | 86 | No Surveys Taken | | | | Not Applicable | | | | Not Applicable | | | | 139 | 2 | 23 | 164 |
| **TOTALS** | 3753 | 261 | 727 | **4741** | 455 | 7 | 2 | **464** | 12.1% | 2.7% | 0.3% | 9.8% | 0.04 | 0.37 | 0.69 | 0.04 | 4239 | 343 | 791 | **5373** |
| Percentages | 79.2% | 5.5% | 15.3% | 100.0% | 100.0% | 0.0% | 0.0% | 100.0% | | | | | | | | | 78.9% | 6.4% | 14.7% | 100.0% |
| **Proportion of Daily Traffic During Survey Period** | | | | | | | | | | | | | | | | | | | | |
| Volume | 2654 | 241 | 451 | **3346** | | | | | | | | | | | | | 2748 | 283 | 532 | **3563** |
| Percentages | 70.7% | 92.3% | 62.0% | 70.6% | | | | | | | | | | | | | 64.8% | 82.5% | 67.3% | 66.3% |

[1] This includes Motorcycles, Cars & Trailers, plus 2 Axles long

[2] This includes Buses and Trucks with 2 thru 4 Axles

[3] This includes double or multi trailer trucks

[4] Confidence interval at 95% confidence level of a proporation of 0.50.

[5] Surveyed vehicles more than counted vehicles for this time period.

[6] Northbound vehicle counts from 9/30/1999 due to tube failure on 9/29/1999.

## Appendix D – Interviewer Training Manual

# PHOENIX EXTERNAL TRAVEL SURVEY

## TRAINING MANUAL

(Draft)

Prepared for

Maricopa Association of Governments
302 North 1st Avenue, Suite 300
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Prepared by

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August 4, 1999

## Introduction

The External Travel Survey for the Maricopa Association of Governments (MAG) is designed to collect data on travel that originates in or passes through the MAG travel model region.

The roadside interview method has been selected as this survey's data collection method. In this type of survey, a sample of vehicles is stopped at each roadside interview station. An interviewer asks the driver a brief list of pre-prepared survey questions. Roadside interviews will be conducted at approximately 15 locations along the perimeter of the MAG study area (See Figure 1 and Table 1).

## Survey Crew Instructions

As part of the survey crew you will be participating in an effort to learn more about certain characteristics of travelers in the Phoenix area. To help you better understand your job, this manual describes the survey and your responsibilities as part of the survey team.

Over the survey period, you will be part of a group of 5-10 people who will participate daily in conducting the survey. This group will be stationed at various locations at the periphery of the Phoenix metro area interviewing travelers and obtaining information regarding their travel.

*Your work is the most important part of the project. Without a successful survey, the outcome of the project will be meaningless.*

The overall project is being directed by Parsons Transportation Group, Inc. for MAG. Representatives of Parsons Transportation Group will be responsible for establishing your daily work assignments, ensuring that you have the materials necessary to complete the assignments, and answering any questions you might have about your assignments.

## Administrative Matters

Before describing what you will actually do during the survey period, it is important to first explain some general rules and requirements. These are things that you should keep in mind as you get ready to conduct the survey.

### Punctuality

It is essential that you report to work on time, and that you meet your supervisor as scheduled. Persons who fail to be on time will be dismissed.

### Appearance

You will be meeting the public daily when performing the survey. The willingness of people to respond to the survey depends largely on how you look. Therefore, you will be expected to wear appropriate clothing and present a neat and professional appearance.

# Figure 1
# MAG External Station Sites

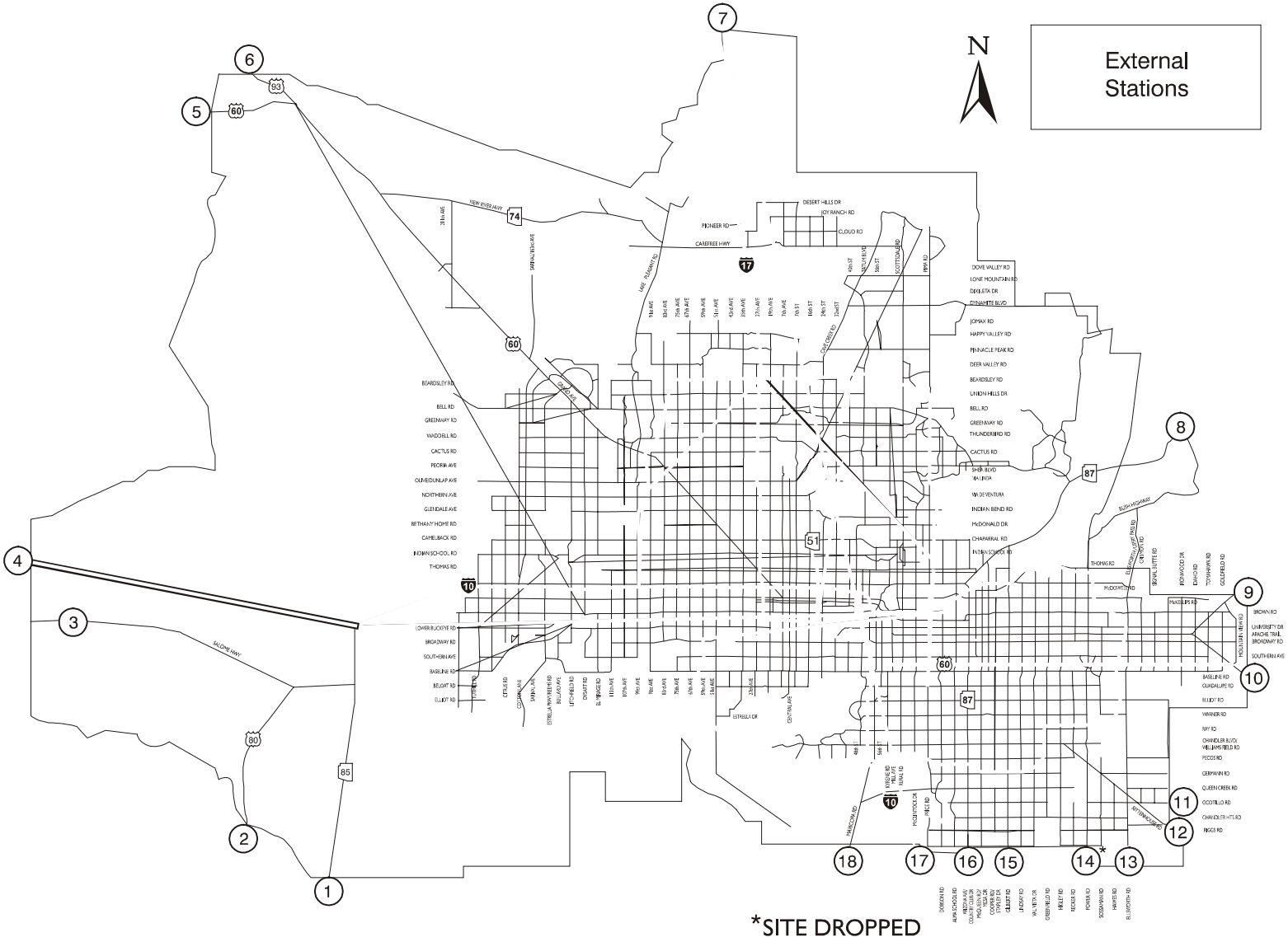

**Table 1**
**Survey Sites and Traffic Volumes**

| Site Number | General Location | 2-way Average Daily Traffic | Typical Peak-Hour, Peak-Direction Volume[1] |
|---|---|---|---|
| 1 | SR-85 at Patterson Road | 9,000 | 430 |
| 2 | Old US 80 at Gila River | 1,000 | 50 |
| 3 | Salome Highway east of Courthouse Road | 1,000 | 50 |
| 4 | I-10 at 477th Avenue | 15,000 | 720 |
| 5 | US 60 at 355th Avenue | 2,000 | 100 |
| 6 | US 93 at Maricopa/Yavapai County Boundary | 6,000 | 290 |
| 7 | I-17 at Maricopa/Yavapai County Boundary | 30,000 | 1,440 |
| 8 | SR 87/Beeline Highway east of Bush Highway | 7,000 | 340 |
| 9[2] | SR 88 south of First Water Road | 5,000 | 240 |
| 10 | US 60 about 3 miles southeast of Goldfield Road | 16,000 | 770 |
| 11 | Ocotillo Road east of Meridian Road | 2,000 | 100 |
| 12 | Rittenhouse Road south of Hunt Highway | 3,000 | 140 |
| 13 | Hunt Highway 1.7 miles east of Ellsworth Road | 3,000 | 140 |
| | Power Road 1.5 miles south of Hunt Highway | Site Dropped[3] | |
| 14[2] | Gilbert Road south of Hunt Highway | 1,000 | 50 |
| 15 | SR 87 at SR87/SR587 Junction | 8,000 | 390 |
| 16 | I-10 south of Hunt Highway | 37,000 | 1,780 |
| 17 | SR 347/Maricopa Road south of Hunt Highway | 9,000 | 430 |

[1] Based on traffic counts performed for an external station survey in Colorado, the peak hour factor is approximately 8 percent and the peak direction split factor is 60 percent.

[2] Traffic counts only will be taken at these sites.

[3] Based on an initial review of the sites, it was discovered that one site originally slated for the external survey, Power Road, 1.5 miles south of Hunt Highway, did not actually exist. Power Road "t's" into Hunt Highway and does not extend to the south. For this reason, the road was dropped from the survey list.

Attitude

Be courteous and polite at all times, while maintaining a business-like attitude. The success of the survey will depend on the impression that you give to drivers participating in the survey.

Some drivers will appear angry at having their trip interrupted. If the person is abusive and/or indicates that he/she will not cooperate by participating in the survey, simply thank the person and step back from the car. If the driver continues to be abusive, walk toward the rear of the car and call your supervisor or law enforcement officer. Under no circumstances should you become involved in an argument or any sort of confrontation with the driver.

Any problems that you encounter should be reported to your supervisor as soon as possible.

Clothing, Food and Other Details

Wear appropriate clothing for the work site. You will be working out-of-doors on county roads and highways. Wear comfortable shoes -- you'll be standing all day. Also, please bring a wristwatch.

You will need to furnish your own meals. Snacks and water and a cooler will be provided. You will not be allowed to leave the work site for breaks or meals.

A portable toilet will be provided at each site.

No smoking or eating in the work area.

Staff violating safety rules, or under the influence of alcohol or drugs will be dismissed immediately.

Cellular telephones at the work site cannot be used for personal calls. Please make your transportation arrangements in advance.

You are responsible for your own transportation to and from the work area. You will not receive separate reimbursement for mileage or your transportation costs.

**Survey Positions**

The successful performance of the survey effort involves four separate positions working together as a team. It is important that you be familiar with each of the survey team responsibilities.

Supervisor

Each survey station will be assigned a site supervisor. That person is responsible for your performance and for taking care of any problems that might arise. The supervisor is responsible for the following items:

- ensuring safety procedures are followed by survey crew members,
- assigning members of the survey crew to positions,
- assigning break times,

- providing equipment needed to carry out the survey,
- assigning meeting time and places,
- working with the flagger to establish procedures for selecting the survey sample and avoiding traffic congestion,
- resolving any questions or problems that arise at a survey location, and
- signing time cards for survey personnel.

Upon arrival at the survey location, the supervisor will distribute all necessary materials (forms, clipboards, pencils, etc.) and will assign you to a specific job. The supervisor will then instruct you when to begin the survey.

Every hour during the survey period the supervisor will collect completed interview forms and place them in clearly marked envelopes. The envelopes will indicate the survey location, the time of day, and the supervisors name.

Law Enforcement Officer

The primary function of the officer is to be visible within the area of the survey site. This will encourage drivers to obey traffic control devices, participate in the interview, and discourage any inappropriate behavior or abuse toward the interviewers and survey crew. The law enforcement officer is under the supervision of the site supervisor. The law enforcement officers may also assist with traffic control.

Interviewers

The interviewers represent the most important element of the total survey process. More than any other position, the interviewers will make direct contact with the drivers passing through the survey station. It is their responsibility to accurately complete the automobile interview form shown as Figure 2 or the commercial vehicle interview form shown in Figure 3.

**It is essential that the interviewer get complete and accurate information for each of the questions. This will be most difficult for the questions regarding trip origins. Note also that each survey must be completed in the shortest time possible (about 2 minutes).**

Flagger

The flagger will be responsible for directing traffic at the survey location.

At some locations, virtually every vehicle arriving at the station will be interviewed. In such a case, the flagger will ensure that the driver has slowed sufficiently so as to be able to stop at the interview position.

Figure 2: Automobile Survey Form

Questionnaire Number: 1

## MARICOPA ASSOCIATION OF GOVERNMENTS
## EXTERNAL TRAVEL SURVEY — AUTOMOBILES

Station Location: US 93 at Maricopa/Yavapai County Boundary Station #: 6 Date: 10 /13 /1999

Interviewer: _____ Day of Week: Wed

| | | | Vehicle 1 | Vehicle 2 |
|---|---|---|---|---|
| Time: | | | ☐ 1 - a.m. ____:____ ☐ 2 - p.m. | ☐ 1 - a.m. ____:____ ☐ 2 - p.m. |
| Vehicle Type: | | | ☐ 1 - passenger car<br>☐ 2 - pickup / van / sport utility<br>☐ 3 - RV (self-contained)<br>☐ 4 - motorcycle | ☐ 1 - passenger car<br>☐ 2 - pickup / van / sport utility<br>☐ 3 - RV (self-contained)<br>☐ 4 - motorcycle |
| Number of people in vehicle: (include infants) | | | ☐ 1 ☐ 2 ☐ 3 ☐ 4<br>☐ more (write): _____ | ☐ 1 ☐ 2 ☐ 3 ☐ 4<br>☐ more (write): _____ |
| What State do you live in? | | | ☐ Arizona<br>☐ other (write) _____ | ☐ Arizona<br>☐ other (write) _____ |
| If Arizona, what county do you live in? | | | ☐ 1 - La Paz ☐ 2 - Maricopa<br>☐ 3 - Pinal ☐ 4 - Yavapai<br>☐ 5 - Yuma ☐ 6 - Gila<br>☐ 7 - Other (write) _____ | ☐ 1 - La Paz ☐ 2 - Maricopa<br>☐ 3 - Pinal ☐ 4 - Yavapai<br>☐ 5 - Yuma ☐ 6 - Gila<br>☐ 7 - Other (write) _____ |
| Was the last place you stopped in Maricopa County? (See Map)<br><br>(Be Specific and get some type information, McDonalds, Safeway, cross streets, etc.) | IF YES: | Place | | |
| | | Street Address | ____ ____ _____ ____<br>Number Dir Street Type | ____ ____ _____ ____<br>Number Dir Street Type |
| | | Intersecting Streets | ____ _____ ____<br>Dir Street Type<br>& ____ _____ ____<br>Dir Street Type | ____ _____ ____<br>Dir Street Type<br>& ____ _____<br>Dir Street Type |
| | | City & Zip | _____ _____<br>City Zip Code | _____ _____<br>City Zip Code |
| | | What was your main purpose for being there? | ☐ 1 - home ☐ 2 - work<br>☐ 3 - work-rel. ☐ 4 - delivery<br>☐ 5 - school ☐ 6 - recreation<br>☐ 7 - shop ☐ 8 - eat<br>☐ 9 - social ☐ 10-pick-up/drop<br>☐ 11-other off passenger<br>➥(write) _____ | ☐ 1 - home ☐ 2 - work<br>☐ 3 - work-rel. ☐ 4 - delivery<br>☐ 5 - school ☐ 6 - recreation<br>☐ 7 - shop ☐ 8 - eat<br>☐ 9 - social ☐ 10-pick-up/drop<br>☐ 11-other off passenger<br>➥(write) _____ |
| | IF NO: | How did you enter Maricopa County? (What Road or Station Number?) | Station Number _____<br>or<br>Road _____ | Station Number _____<br>or<br>Road _____ |
| What time did you leave from there? (or, What time did you enter Maricopa County?) | | | ☐ 1 - a.m. ____:____ ☐ 2 - p.m. | ☐ 1 - a.m. ____:____ ☐ 2 - p.m. |
| To what city or area are you going next? | | City | | |
| | | State | ☐ 1-Arizona ☐ 2-California<br>☐ 3-Colorado ☐ 4-New Mexico<br>☐ 5-Utah ☐ 6-Mexico<br>☐ 7 - other (write) _____ | ☐ 1-Arizona ☐ 2-California<br>☐ 3-Colorado ☐ 4-New Mexico<br>☐ 5-Utah ☐ 6-Mexico<br>☐ 7-other (write) _____ |
| What is your main purpose for going there? | | | ☐ 1 - home ☐ 2 - work<br>☐ 3 - work-rel. ☐ 4 - delivery<br>☐ 5 - school ☐ 6 - recreation<br>☐ 7 - shop ☐ 8 - eat<br>☐ 9 - social ☐ 10-pick-up/drop<br>☐ 11-other off passenger<br>➥(write) _____ | ☐ 1 - home ☐ 2 - work<br>☐ 3 - work-rel. ☐ 4 - delivery<br>☐ 5 - school ☐ 6 - recreation<br>☐ 7 - shop ☐ 8 - eat<br>☐ 9 - social ☐ 10-pick-up/drop<br>☐ 11-other off passenger<br>➥(write) _____ |

Figure 3: Commercial Vehicle Survey Form

Questionnaire Number: 1

# MARICOPA ASSOCIATION OF GOVERNMENTS
# EXTERNAL TRAVEL SURVEY — COMMERCIAL TRUCK

Station Location: I-10 South of Hunt Highway Station #: 17 Date 10//12/1999

Interviewer: _____ Day of Week: Tue

| | | | Vehicle 1 | Vehicle 2 |
|---|---|---|---|---|
| Time: | | | ☐ 1 - a.m. ☐ 2 - p.m. | ☐ 1 - a.m. ☐ 2 - p.m. |
| Vehicle Type | | | ☐ 1 - step-van ☐ 2 - bus<br>Single unit truck<br>☐ 3 - 2 axles ☐ 4 - 3+axles<br>Combination truck<br>☐ 5 - 1 trailer ☐ 6 - 2+ trailers | ☐ 1 - step-van ☐ 2 - bus<br>Single unit truck<br>☐ 3 - 2 axles ☐ 4 - 3+axles<br>Combination truck<br>☐ 5 - 1 trailer ☐ 6 - 2+ trailers |
| Type of Load<br><br>(*Specify the product each truck is hauling) | | | ☐ 1 - Empty<br>☐ 2 - Mixed* ☐ 3 - Bulk*<br>☐ 4 - Liquid* ☐ 5 - Other*<br>(product)_____ | ☐ 1 - Empty<br>☐ 2 - Mixed* ☐ 3 - Bulk*<br>☐ 4 - Liquid* ☐ 5 - Other*<br>(product)_____ |
| What is the name of the place where this vehicle garaged? (e.g., Ryder Trucks, FedEx, ...)<br><br>And, what is the address there? (or intersecting streets--get something!!) | | Place Name | | |
| | | Street Address | ____ ____ _____ ____<br>Number Dir Street Type | ____ ____ _____ ____<br>Number Dir Street Type |
| | | City | | |
| | | State | ☐ Arizona<br>☐ Other (write)_____ | ☐ Arizona<br>☐ Other (write)_____ |
| | | ZIP Code | | |
| What is the primary type of business of the company for which you are driving this truck? (Select only ONE type!) | | | ☐1 - Agriculture ☐2 - Forestry<br>☐3 - Mine/Quarry ☐4 - Constr.<br>☐5 - Manufac. ☐6 - Retail<br>☐7 - Wholesale ☐8 - Utilities<br>☐9 - Government ☐10-Service<br>☐11 -For-hire/shipping<br>☐12 -Daily Rental<br>☐13 -Other: _____ | ☐1 - Agriculture ☐2 - Forestry<br>☐3 - Mine/Quarry ☐4 - Constr.<br>☐5 - Manufac. ☐6 - Retail<br>☐7 - Wholesale ☐8 - Utilities<br>☐9 - Government ☐10-Service<br>☐11 -For-hire/shipping<br>☐12 -Daily Rental<br>☐13 -Other: _____ |
| Was the last place you stopped in Maricopa County? (See Map)<br><br>(Be Specific and get something, McDonalds, Safeway, cross streets, etc.) | IF YES: | Place Name | | |
| | | Street Address | ____ ____ _____ ____<br>Number Dir Street Type | ____ ____ _____ ____<br>Number Dir Street Type |
| | | Intersecting Streets | ____ _____ ____<br>Dir Street Type<br>& ____ _____ ____<br>Dir Street Type | ____ _____ ____<br>Dir Street Type<br>& ____ _____ ____<br>Dir Street Type |
| | | City & ZIP Code | _____ _____<br>City Zip Code | _____ _____<br>City Zip Code |
| | | What was your main purpose for being there? | ☐ 1 - Pick-up ☐ 2 - Delivery<br>☐ 3 - Shop/Fuel ☐ 4 - Eat<br>☐ 5 - Sleep/Rest ☐ 6 - Work<br>☐ 7 - Base/Terminal<br>☐ 8 - Vehicle Maintenance<br>☐ 9 - Other: _____ | ☐ 1 - Pick-up ☐ 2 - Delivery<br>☐ 3 - Shop/Fuel ☐ 4 - Eat<br>☐ 5 - Sleep/Rest ☐ 6 - Work<br>☐ 7 - Base/Terminal<br>☐ 8 - Vehicle Maintenance<br>☐ 9 - Other: _____ |
| | IF NO: | How did you enter Maricopa County? (What station number or Road?) | Station Number _____<br>or<br>Road _____ | Station Number _____<br>or<br>Road _____ |
| To what city or area are you going next? | | City | | |
| | | State | ☐ 1 - Arizona ☐ 2 - California<br>☐ 3 - Colorado ☐ 4 - New Mexico<br>☐ 5 - Utah ☐ 6 - Mexico<br>☐ 7 - Other (write) _____ | ☐ 1 - Arizona ☐ 2 - California<br>☐ 3 - Colorado ☐ 4 - New Mexico<br>☐ 5 - Utah ☐ 6 - Mexico<br>☐ 7 - Other (write) _____ |
| What will be your main purpose for being there? | | | ☐ 1 - Pick-up ☐ 2 - Delivery<br>☐ 3 - Shop/Fuel ☐ 4 - Eat<br>☐ 5 - Sleep/Rest ☐ 6 - Work<br>☐ 7 - Base/Terminal<br>☐ 8 - Vehicle Maintenance<br>☐ 9 - Other: _____ | ☐ 1 - Pick-up ☐ 2 - Delivery<br>☐ 3 - Shop/Fuel ☐ 4 - Eat<br>☐ 5 - Sleep/Rest ☐ 6 - Work<br>☐ 7 - Base/Terminal<br>☐ 8 - Vehicle Maintenance<br>☐ 9 - Other: _____ |

At locations having higher traffic volumes, the flagger will select (using pre-established rules) the vehicles that must be interviewed and those that will be allowed to bypass. The flagger must also be aware of potential traffic congestion problems. With the direction of the supervisor, the flagger will adjust the survey sample to reduce traffic backups.

**Survey Equipment**

Each day you will be provided with a kit of materials needed to conduct the survey. Note that each crew member will be provided with an orange safety vest and hard hat. The vest and hard hat *must be worn at all times* at the survey location. While it is important that we receive valid results from the surveys, *nothing is more important than maintaining a safe environment at the survey location*. Any crew member found not wearing his/her vest while at the survey location will be dismissed.

Interviewer's Kit

The interviewer will receive the following equipment:

- survey forms,
- clipboard,
- pencils,
- orange safety vest, and
- hard hat.

Your supervisor will have a supply of extra survey forms and pencils.

Flagger's Kit

The flagger will be provided with the following items:

- orange flag (approximately 24 inches square) or paddle board, and
- orange safety vest.

**Survey Procedures**

This section describes a typical survey shift. It includes information concerning how the survey will be carried out on a daily basis.

Meet Supervisor

Each day you will meet your supervisor at the survey site. The supervisor will make the initial crew assignments for the day and will distribute the necessary materials (forms, clipboards, etc.).

Prepare Forms

Both the interview forms will have descriptive information about the survey site preprinted at the top of the sheet. Your supervisor will tell you the station number, name and location. Verify that this information agrees with the information printed at the top of the forms. Return any forms not in agreement to your supervisor.

Conduct Surveys

At a time specified by your supervisor, the supervisor will instruct the members of the crew to take their positions and the survey will begin.

- *Flagger*. Flaggers must be visible to oncoming vehicles and should keep an eye on that traffic at all times. Flaggers will be positioned so that they can effectively control which vehicles must stop and which will be allowed to pass. The flagger will not step into the traveled way to direct traffic. Flagging will occur from the shoulder area. Failure to follow these safety precautions will result in dismissal.

- *Interviewer*. The interviewers will be located within the site's "work site." Except while performing an interview, they should remain behind the cones separating them from passing traffic. Interviewers may use hand signals (from behind the cones) to direct survey vehicles to their survey site.

- *Breaks*. There will be at least one relief person at each survey site (in some cases, the site supervisor will function as the relief person). Each person will be permitted a 15 minute break every two hours and a half-hour lunch break. The site supervisor is responsible for scheduling breaks for all survey staff including flaggers.

End of Shift

At the end of your shift, the supervisor will collect your materials, sign your time cards, and dismiss you for the day.

**Data Collection Procedures**

Flaggers

Prior to beginning the data collection effort, the flagger(s) will be instructed by the supervisor as to which vehicles should be stopped at each station. At stations having low daily volumes, the flagger may be told to stop all traffic passing through the station. At high volume locations, he/she will be told to stop vehicles once the survey area is clear. If necessary, the supervisor will work with the flagger to make adjustments to the vehicle selection process if traffic congestion becomes a problem.

The flagger should face oncoming traffic at all times. To stop a vehicle, hold the orange flag at arm's length across the traffic lane, in front of the vehicle. If a paddle-board is used, hold it upright at arms length displaying the “slow” or “stop” message as appropriate. Your free hand should be held aloft, with the palm facing the driver of the car. To reinforce the message, eye contact should be made with each driver.

When waving a vehicle past the station, stand parallel to the roadway, hold the flag at arm's length pointing in the vehicle's direction of travel. Using a waving motion with your free hand, direct the vehicle past the station.

At stations where a bypass lane is provided (on multi-lane roadways) the flagger must separate the selected vehicles from the stream of traffic. Signs and cones will have slowed traffic to a reasonable speed. However, it is important to provide sufficient advance warning to vehicles requiring to change directions (for example, a car pulling into the interview lane). For vehicles that will not be interviewed, simply wave them through as described above. To direct a vehicle into the interview lane: 1) attempt to make eye contact with driver; 2) point the orange flag held in your right hand at the vehicle (or left

hand if a paddle-board is used); and 3) direct the vehicle into the interview lane with your free (left) hand.

Under no circumstances should the flagger step into the moving traffic lane.

When necessary, the flagger will be assisted by the law enforcement officer who will be present at high traffic volume sites.

Interviewers

The interviewers have responsibility for making notes on the vehicle type and asking the driver the survey questions. Surveys should be performed quickly (two minutes or less).

The interviewers should watch as cars approach their positions. They should at all times be prepared to react to unexpected actions on the part of drivers. The interviewers should raise their hand as a signal to stop. As soon as the vehicle is fully stopped, approach the driver and begin the survey.

Survey Forms and Interview Procedures—Automobiles

The "automobile" survey form is shown in Figure 2. This form will be used for all passenger cars, pickup trucks, passenger vans and minivans, recreational vehicles (self-propelled), and motorcycles. Do not use this form for panel vans (e.g., FedEx or UPS vans), passenger buses, or large commercial trucks.

The top of the form contains survey control information. This information is used for survey tracking and quality control. Most of the information (questionnaire number, station location, station number, date, and day of week) will be pre-printed.

You must print your first name or initials on the interviewer line. If there is another surveyor with the same first name, use your initials or first name and first initial of your last name. Do not use a form with another person's name or initials.

There is space for two surveys on each questionnaire. To the maximum extent possible, complete two surveys for each questionnaire. If a survey is terminated early or for some other reason is unusable, put an "X" through the survey **for the vehicle that should not be used**. The "X" should start in the top corners of the column for the unusable vehicle to the opposing bottom corners for the same vehicle.

Complete the following questions as the vehicle approaches:

*Survey time.* Record this information to the nearest minute and check the appropriate box for am or pm. Do **not** record time in military time format (i.e., using a 24-hour clock). Time information is crucial since completed surveys must be matched to automated traffic counts taken near the survey site. Noon should be recorded as 12:00 pm.

*Vehicle type*: Simply check the appropriate box.

*Number of persons in vehicle:* Observe how many people are in the vehicle, including infants. If you are unable to determine how many people are in the vehicle, ask the driver about the vehicle occupancy. Check off the appropriate box and record the actual number if there are 5 or more people in the vehicle.

Introduce yourself to the driver: "*Hello, we are doing a travel survey for the Maricopa Association of Governments. May I ask you a few quick questions about your travel today?*"

If the driver does not want to participate, thank him/her and allow them to leave the survey area when traffic is clear.

If they agree to participate, continue with the interview, asking the questions as printed in the order listed.

Recording accurate address information for the place last stopped is crucial to the success of the survey ("*Was the place you last stopped in Maricopa County?).* This is the last place where a stop for an activity (e.g., home, work, eat, shop, rest stop, etc.) was made. Do not get information for "stops" for traffic congestion or traffic signals. If the last activity location was within Maricopa County, record the establishment name for non-residential locations and the exact address including street number, street direction (N, S, E, W), street name, and the street suffix (avenue, street, boulevard, place, terrace, drive, ...), the city (Phoenix, Mesa, Tempe, ...), and the zip code.
Many of the drivers you interview will not know all of the information. Get as much information as possible. If the address is not known, ask for the nearest cross-streets, a building name, or the approximate distance from the external station site. This information, along with a place name, can be used to determine an exact address.

If the last stop was outside of Maricopa County, ask what roadway was used to enter Maricopa County. You can show the laminated map provided to you at the survey site to help determine the location. You can record either the station number, if it corresponds to an entry location, or the actual roadway name. Since some roadways extend entirely across Maricopa County (e.g., I-10), record sufficient information to identify the entry location (e.g., I-10 from west).

In response to *"What was your main purpose for being there?"* check only one item in the list. The following definitions apply to the categories:

1. Home This designates the driver's home, not a friend's or relative's home.
2. Work This designates the driver's normal place of work, not a job site or client's office.
3. Work-related This designates that the driver is coming from a place of work that is not his/her normal place of work, such as a job site or a client's office.
4. Delivery This designates a location where the driver *picked up* or *delivered* something other than a person. This may or may not be work related.
5. School This designates that the driver was at school.
6. Recreation This designates that the driver was at the last location for recreational purposes.
7. Shop This designates that the driver was at the last location to shop.
8. Eat This designates that the person stopped at the last location to eat.
9. Social This designates that the driver was at the last location for social (e.g., visiting) purposes.
10. Pick up / drop off passenger This designates a location where the driver *picked up* or *dropped off* a passenger (as opposed to a package or product-see category 4).
11. Other (specify) If some other purpose is mentioned or if you are not sure which purpose to check, put a check in "other" and write in a brief description of the purpose.

Record the response to the question, *"What time did you leave that place?"* using a 12-hour clock and mark am or pm. Noon should be recorded as 12:00 pm and midnight should be recorded as 12:00 am.

The question, *"Where are you going next?"* focuses on the respondent's next planned stop. Simply record the city or place (e.g., the Grand Canyon) and the state. Check-off boxes have been provided

for surrounding states and Mexico. If the next intended stop is located in a state not listed, check "other" and write the name of the state on the blank line.

The definitions for responses to the question, *"What is your main purpose for going there?"* are the same as listed above.

Survey Forms and Interview Procedures—Commercial Trucks

The "commercial truck" survey form is shown in Figure 3. This form will be used for all panel vans (e.g., FedEx or UPS vans), passenger buses, and large commercial trucks. Do not use this form for passenger cars, pickup trucks, passenger vans and minivans, recreational vehicles (self-propelled), or motorcycles.

The top of the form contains survey control information. This information is used for survey tracking and quality control. Most of the information (questionnaire number, station location, station number, date, and day of week) will be pre-printed.

You must print your first name or initials on the interviewer line. If there is another surveyor with the same first name, use your initials or first name and first initial of your last name. Do not use a form with another person's name or initials.

There is space for two surveys on each questionnaire. To the maximum extent possible, complete two surveys for each questionnaire. If a survey is terminated early or for some other reason is unusable, put an "X" through the survey **for the vehicle that should not be used**. The "X" should start in the top corners of the column for the unusable vehicle to the opposing bottom corners for the same vehicle.

Complete the following questions as the vehicle approaches:

*Survey time.* Record this information to the nearest minute and check the appropriate box for am or pm. Do **not** record time in military time format (i.e., using a 24-hour clock). Time information is crucial since completed surveys must be matched to automated traffic counts taken near the survey site. Noon should be recorded as 12:00 pm.

*Vehicle type*: Simply check the appropriate box. A step-van is a van with the cargo area accessible from the cab such as a Federal Express van or a UPS van. A single unit truck is a truck with the cab and cargo area on the same frame. A combination truck is a truck with a tractor and a detachable trailer(s). Note, however, if a combination truck tractor with no trailer attached is selected for the survey, record the tractor as a single unit truck with the appropriate number of axles.

Introduce yourself to the driver: "*Hello, we are doing a travel survey for the Maricopa Association of Governments. May I ask you a few quick questions about your travel today?*"

If the driver does not want to participate, thank him/her and allow them to leave the survey area when traffic is clear.

If they agree to participate, continue with the interview, asking the questions as printed in the order listed.

For *"Type of Load,"* check one of the five boxes as appropriate and, if the vehicle is not empty, record the product or products being transported. The following definitions should be used:

1. Empty means that the truck is not carrying any products.
2. Mixed should be used for trucks transporting packaged materials. For example, a truck carrying 90 pound sacks of concrete to a building site would be considered to be carrying a mixed load.
3. Bulk should be used for other trucks carrying unpackaged dry materials such as gravel or rock, dry cement, timber or cut lumber, etc. Bulk loads should not have mixed commodities. For example, dry cement and cut lumber being carried on a single truck to a building site would be recorded as a mixed load, not a bulk load. If only the cut lumber was being carried by the truck, the load could be recorded as bulk.
4. Liquid should be used only for tanker trucks carrying bulk liquids, such as a gasoline tanker or milk tanker. Note that some tanker trucks carry dry materials (e.g., bulk cement) and would be recorded under bulk, not liquid. Trucks carrying packaged liquids such as one-gallon jugs of milk should be recorded as mixed loads.
5. Other should be used for any other type of load or if you are unsure of the type of load.

Record all address information as requested for the place the commercial vehicle is normally garaged. This is not necessarily the same location as where the vehicle is registered.

The *"primary type of business for which you are driving"* refers to person driving the truck. Thus, the truck might be owned by a leasing company but leased to a freight hauling company. In this case, the business would be "for-hire / shipping." Likewise, if the driver works for a freight hauling company and is transporting auto parts from General Motors, the business would be "for-hire / shipping."

Recording accurate address information for the place last stopped is crucial to the success of the survey ("*Was the place you last stopped in Maricopa County?).* This is the last place where a stop for an activity (e.g., home, work, eat, shop, rest stop, etc.) was made. Do not get information for "stops" for traffic congestion or traffic signals. If the last activity location was within Maricopa County, record the establishment name for non-residential locations and the exact address including street number, street direction (N, S, E, W), street name, and the street suffix (avenue, street, boulevard, place, terrace, drive, ...), the city (Phoenix, Mesa, Tempe, ...), and the zip code.
Many of the drivers you interview will not know all of the information. Get as much information as possible. If the address is not known, ask for the nearest cross-streets, a building name, or the approximate distance from the external station site. This information, along with a place name, can be used to determine an exact address.

If the last stop was outside of Maricopa County, ask what roadway was used to enter Maricopa County. You can show the laminated map provided to you at the survey site to help determine the location. You can record either the station number, if it corresponds to an entry location, or the actual roadway name. Since some roadways extend entirely across Maricopa County (e.g., I-10), record sufficient information to identify the entry location (e.g., I-10 from west).

In response to *"What was your main purpose for being there?"* check only one item in the list. The following definitions apply to the categories:

1. Pick-up This designates that the driver picked up a load or a portion of a load at the last stop.
2. Delivery This designates the driver delivered a load or a portion of a load at the last stop.
3. Shop/Fuel This designates that the driver is coming from a place where he / she fueled the vehicle or purchased something for personal use (purchasing the load or portion of the load being carried would be recorded under "pick-up").
4. Eat This designates that the driver stopped at the last location to eat.
5. Sleep/Rest This designates that the driver was at the last location for personal rest. This could be the driver's home, a motel, a rest stop, or some location along the road.

6. Work This designates that the driver was at the last location to perform some work other than picking up or delivering a load. This might be used, for example, for a service person driving a panel van with his / her tools or parts.
7. Base/Terminal This designates that the driver's last stop was at the location where the truck is normally garaged.
9. Other (specify) If some other purpose is mentioned or if you are not sure which purpose to check, put a check in "other" and write in a brief description of the purpose.

The question, *"Where are you going next?"* focuses on the respondent's next planned stop. Simply record the city or place (e.g., the Grand Canyon) and the state. Check-off boxes have been provided for surrounding states and Mexico. If the next intended stop is located in a state not listed, check "other" and write the name of the state on the blank line.

The definitions for responses to the question, *"What is your main purpose for going there?"* are the same as listed above.

Survey Termination Procedures

When the survey is complete, thank the driver and allow him/her to leave (or instruct him/her to leave when the survey area clears). When vehicles are pulled in "platoons" the driver should not be released until the vehicle in front of him / her leaves. Be aware of other traffic in the area when allowing the driver to leave.

As soon as this is complete, immediately redirect your attention to incoming vehicles.

Each survey form has room for two interviews. When the form is full (two interviews have been completed), remove the form from the clipboard and replace it at the bottom of the stack of forms. Each hour your supervisor will collect all completed and partially completed survey forms and place them in a specially-marked envelope.

**Safety Procedures**

Your safety is an essential part of this survey! To help ensure your safety:

- all survey staff assigned to a work site will work strictly within the confines of the work zone,
- all staff in the work site will wear an orange vest and hard hat during their assigned work times,
- no staff will be allowed to cross the roadways while there is traffic present,
- staff shall park their vehicles away from the work zone so as to allow for smooth transition of vehicular movement,
- staff will not impede the flow of traffic through the work site,
- your site supervisor has final authority at the work site.

**Emergency Telephone Numbers**

Police/Fire/Medical 911

*Chris Kmetty*
PARSONS TRANSPORTATION GROUP, Inc. (Phoenix)
(602) 852-9195 Work
(602) ???-???? Home

*David Kurth*
PARSONS TRANSPORTATION GROUP, Inc. (Denver)
(303) 863-7900 Work

(303) 744-6633 Home

*Mark Schlappi*
MARICOPA ASSOCIATION OF GOVERNMENTS
(602) 254-6300 Work

*We look forward to working with you on the*
**PHOENIX EXTERNAL TRAVEL SURVEY!**